
 DIGITAL RESEARCH™
CP/M®-86

Part I
Z-100 Utilities

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Essential requirements for using CP/M-86 Operation System;

- a. Distribution Media: Three 5.25-inch soft-sectored, double-sided 48-tpi disks
- b. Machine Configuration (minimum): 128K memory, one disk drive and CRT

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PREFACE

CP/M® is an acronym for the Control Program for Microcomputers, the operating system that has been the industry standard because of its convenience and wide range of practical applications.

This manual is designed to help you use CP/M-86 productively in your microcomputer environment. It is divided into four parts plus an introduction.

If microcomputers or the CP/M operating system are new to you, the Introduction will acquaint you with the basic concepts and materials you will be using. The Introduction also contains a section on Software Preparation Procedures that describes a procedure for making backup and working copies. By doing so, you will be able to protect your investment by permanently storing your CP/M-86 distribution disks in a secure place.

- Part I, "Z-100 Utilities," contains instructions for using each of the utility programs created by Zenith Data Systems to enhance the use of CP/M-86 with your H/Z-100 series computer.
- Part II, the CP/M-86 "User's Guide," was written by Digital Research Corp., the creators of CP/M-86. It contains a basic introduction to the system, instructions for using the built-in commands, and instructions for using each of the utility programs supplied by Digital Research.
- Part III, the "CP/M-86 System Guide," contains a detailed description of the system functions and internal structure of CP/M-86. It is supplied by Digital Research for persons creating software that will use system functions.
- Part IV, the "CP/M-86 Programmer's Guide," describes the use of ASM-86 to create assembly language programs for the Intel 8086 family of microprocessors. The Programmer's Guide is also supplied by Digital Research Corp.

PREFACE

Essential Requirements

Use of CP/M-86 is limited to the following specifications:

1. **Distribution Media**—Three, soft-sectored, double-sided, 5.25-inch, 48-TPI, floppy disks at double density.
2. **Disk Format**—Soft-sectored, 5.25-inch, 48-TPI or 96-TPI floppy disks at double density; soft-sectored, 8-inch floppy disks; or a single soft-sectored, 5.25-inch floppy disk and Winchester system.
3. **Minimum Hardware**—Z-100 or H-100 microcomputer with attached or separate video screen.

INTRODUCTION

Beginning Concepts

This part of the manual explains concepts that are important when you are using the CP/M Operating System within your Heath/Zenith microcomputer environment.

The concepts explained here are grouped under the headings:

- "Microcomputer Concepts" Provided for individuals who have never used microcomputers, and for individuals with limited microcomputer experience who wish to review.
- "CP/M Concepts" Provided for individuals who are unfamiliar with the CP/M Operating System.

Individuals who are proficient at using both microcomputers and CP/M can skip this section of the manual, and proceed directly to "Software Preparation Procedures."

To control and manipulate the CP/M Operating System, you will be responding to prompts that appear on the screen. Be sure to read "Examples of User/Computer Dialog" so that you will be able to distinguish the style used in this manual to represent user input and screen displays.

Examples of User/Computer Dialog

This text contains examples of user interaction with a microcomputer. In these examples, displays presented on the screen will be represented by the following typestyle:

THIS TYPESTYLE represents terminal displays

0123456789#\$*?:=.A>()

Command syntax and entries that are displayed on the screen are represented in the following typestyle:

THIS TYPESTYLE represents command syntax

0123456789#\$*?:=.A>()

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Examples of User/Computer Dialog

User input (the characters that you type through the terminal) except commands or entries displayed on the screen will be represented by boldface type, as shown:

BOLDFACE TYPE represents the things you type

0123456789#\$*?:=[.]()

When you should enter a carriage return by pressing the key marked RETURN, the example will show **RETURN**.

In many instances, the exact text of a display will vary by a few characters. This manual often substitutes a few letters in place of exact characters where variations are likely to occur. For instance, this manual will illustrate a program's serial number as "Serial number sss-sssss," while your terminal might actually display it as "Serial number 357-81469."

In cases where the exact characters you type will vary, this manual presents a description of the necessary characters within curved braces, {}.

Hence, this manual might explain that an entry should be made in the form **B: =A:{filename.ext} RETURN**, when you actually type the characters **B: =A: CONFIGUR.COM RETURN**.

Hardware device model numbers beginning with the "H/Z" prefix are references to either a Heath device, a Zenith device, or both. For example "H/Z-100" in this manual refers to hardware devices that are labeled either "H-100" or "Z-100."

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Microcomputer Concepts

Your microcomputer is a sophisticated piece of equipment that reflects the latest technical advances in the computer field. But this machine is practically useless without the programs (instructions) that tell it what to do.

These programs are stored on disks and are used by your microcomputer when they are required to perform a task. This section explains how the programs are stored on disks, shows you how to handle your disks, and defines two important types of program: the operating system and the application program.

Disks

Stored information, or data, is arranged in concentric rings on the surface of a disk. These rings are called "tracks." Each track is divided into areas called "sectors." Each sector contains data measured in units called "bytes." A byte of data could be one letter typed at the terminal keyboard or one instruction in a program. But since a byte is such a small unit, you will more often see data measured in "kilobytes." A kilobyte (abbreviated as "K") is equal to 1024 bytes.

Data are transferred to disks in the form of magnetic impulses generated by an electromagnet called the "read-write head." As the name implies, the read-write head can read data from the disk or write data on the disk—similar to the way in which the head in a tape recorder transfers magnetic impulses to and from a cassette tape.

But unlike a tape recorder, a disk drive unit can transfer data at any location on the disk surface almost instantly, because the drive is usually spinning the disk at a high rate of speed. Whenever the read-write head is instructed to read or write data at a particular location on the disk, it positions itself along the appropriate track and skims across the surface of the disk as the appropriate sector spins by. Each disk has a directory that tells the read-write head which track and sector it should access to transfer the necessary information in the proper sequence.

There are two different kinds of tracks on every disk: system tracks and file tracks. System tracks are reserved for part of your operating system, and they are usually the two or three outermost tracks on the disk. File

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tracks are reserved for files, and they are the inner tracks on the disk. (Upcoming text will explain the concepts behind operating systems and files.)

NOTE: Before data can be written on a disk, the surface of the disk must be prepared. Disk preparation is performed by a program called "FORMAT," which is stored on your Distribution Disk. FORMAT prepares the disk surface by dividing it into tracks and sectors. The procedures for constructing backups and customizing the operating system will show you how to prepare disks using FORMAT.

Floppy Disks

A *floppy disk* is a circular sheet of mylar plastic with a magnetic oxide on its surface and a square plastic cover.

Floppy disks, and the data stored on them, are fragile. Therefore, you should adhere to the following precautions to ensure that disks and stored data are not damaged.

Floppy Disk Handling Precautions

- When you are holding the disk, touch only the protective square disk cover. Do not touch the brownish disk surface that shows through the read-write access slots in the disk cover.
- Keep the disk in the protective paper envelope whenever it is not within a disk drive.
- Do not allow dust, ashes, liquid, or any other foreign material to contact the disk surface.
- Keep the disk away from electric motors, appliances, telephones, etc., as these devices contain magnets that could alter the magnetic impressions on the disk.

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- Never put a disk into a drive unit before turning on hardware equipment; and never leave a disk in a drive unit while the power is being turned off. Sudden fluctuations in the power supply to your hardware environment could cause the read-write head to write on the disk surface, and destroy stored information.
- Do not expose disks to temperatures above 125 degrees Fahrenheit (52 Centigrade), or temperatures below 40 degrees Fahrenheit (4 Centigrade).
- Never press a ball-point pen or a pencil directly against the cover of a disk. Instead, mark disk labels before attaching them to the disk cover, or mark them using a felt-tip pen while they are on the disk cover.
- Do not allow the disk or its cover to be bent, creased, or torn.
- Do not attach paper clips to the disk.

Write-Protecting and Write-Enabling Floppy Disks

You can mechanically prevent or allow the writing or erasing of information to or from your disks by covering or uncovering the notch in the disk cover with specially-provided tabs. The way that you use these tabs depends on the size of the disk.

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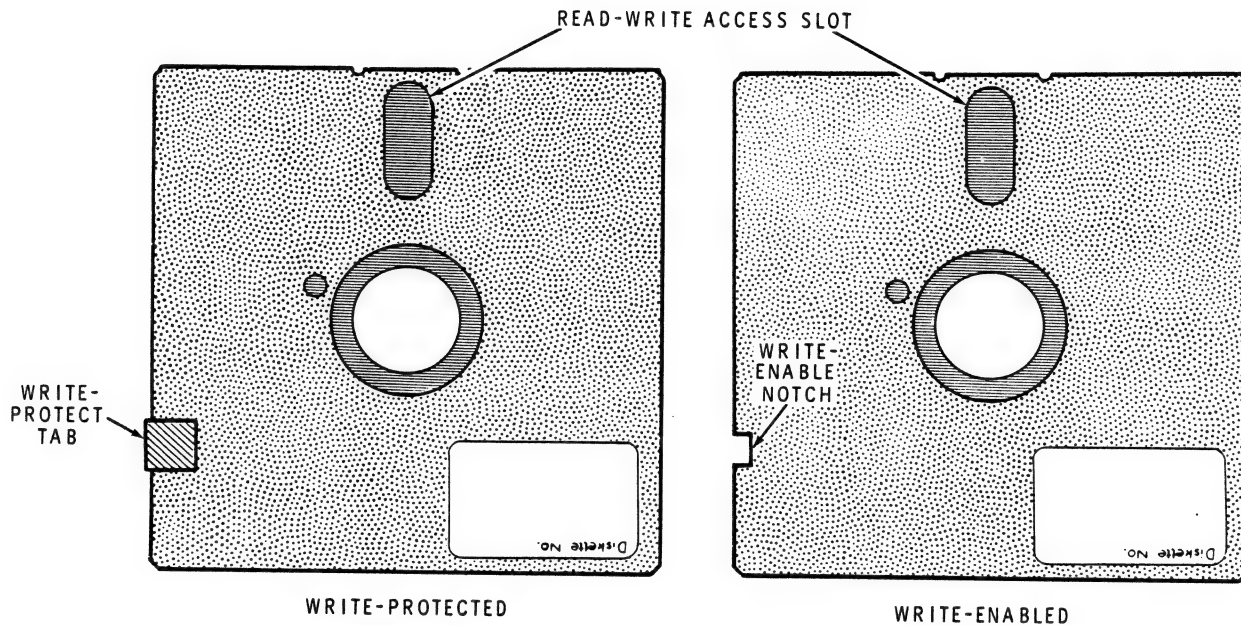


Figure 1.1 5.25-inch Floppy Disks

With 5.25-inch disks, the notch is covered to *prevent* you from writing to or erasing from the disk. Therefore, by putting the tab on a 5.25-inch disk, you are "write protecting" the disk. A 5.25-inch disk with a notch that is not covered can be written to or erased from. Therefore, a 5.25-inch disk with an uncovered notch is "write-enabled." Figure 1.1 illustrates this distinction.

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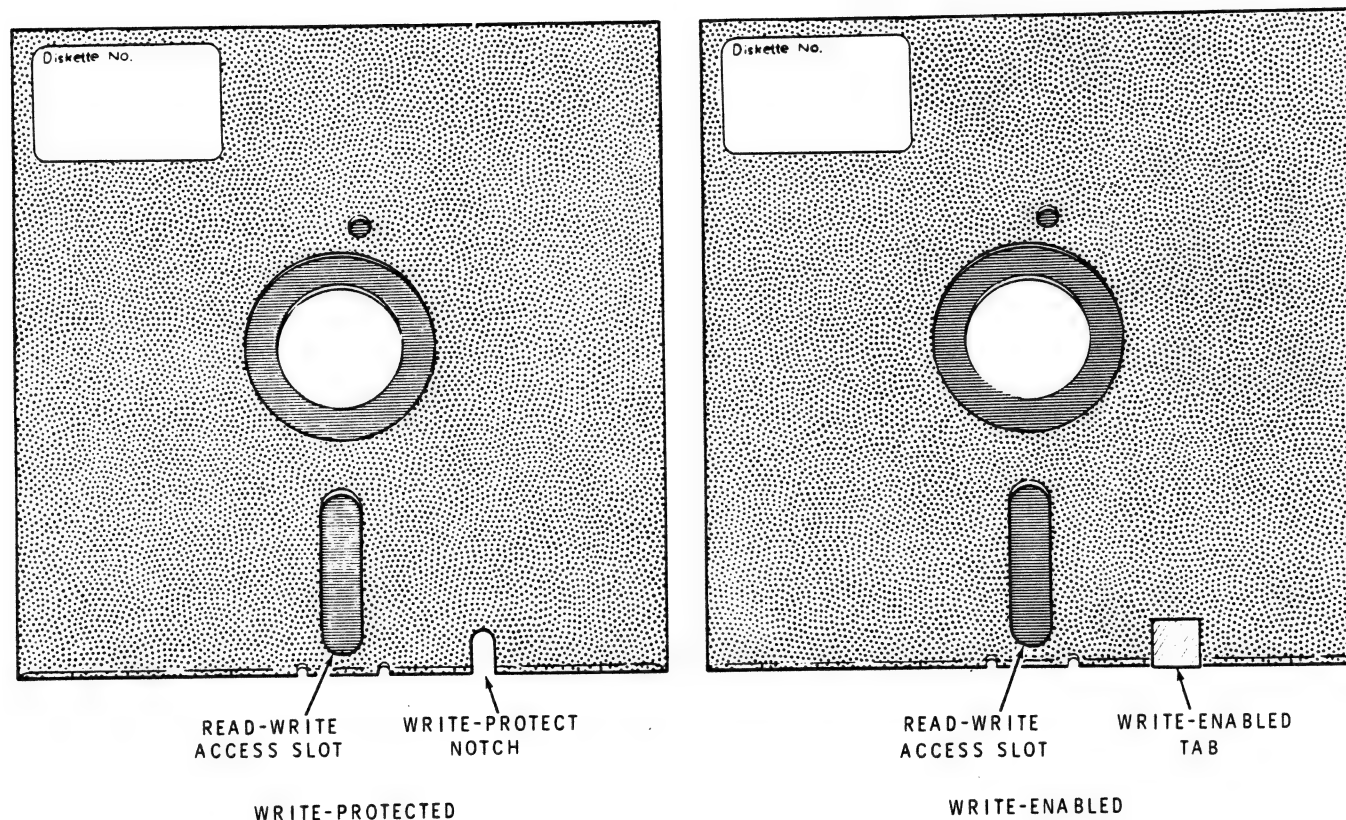


Figure 1.2 8-inch Floppy Disks

With 8-inch disks, the notch is covered to *allow* you to write to or erase from the disk. Therefore, by putting the tab on an 8-inch disk, you are "write enabling" the disk. An 8-inch disk with a notch that is not covered can not be written to or erased from. Therefore, an 8-inch disk with an uncovered notch is "write-protected." Figure 1.2 illustrates this distinction.

NOTE: Whether a disk is write-protected or write-enabled, you can usually read or copy data from it.

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Inserting Floppy Disks

To ensure that data stored on your floppy disks can be safely and efficiently accessed, the disks must be inserted into drives carefully and correctly.

When you insert a floppy disk into a disk drive, point the oblong holes in the square plastic cover towards the back of the drive. A label is usually affixed to one side of the plastic disk cover, and this label should face upward on the right side as the disk is inserted into the drive. When the disk is fully inserted in the drive slot, close the drive latch.

Figure 1.3 illustrates the proper technique for inserting floppy disks into some of the drives that Heath/Zenith offers.

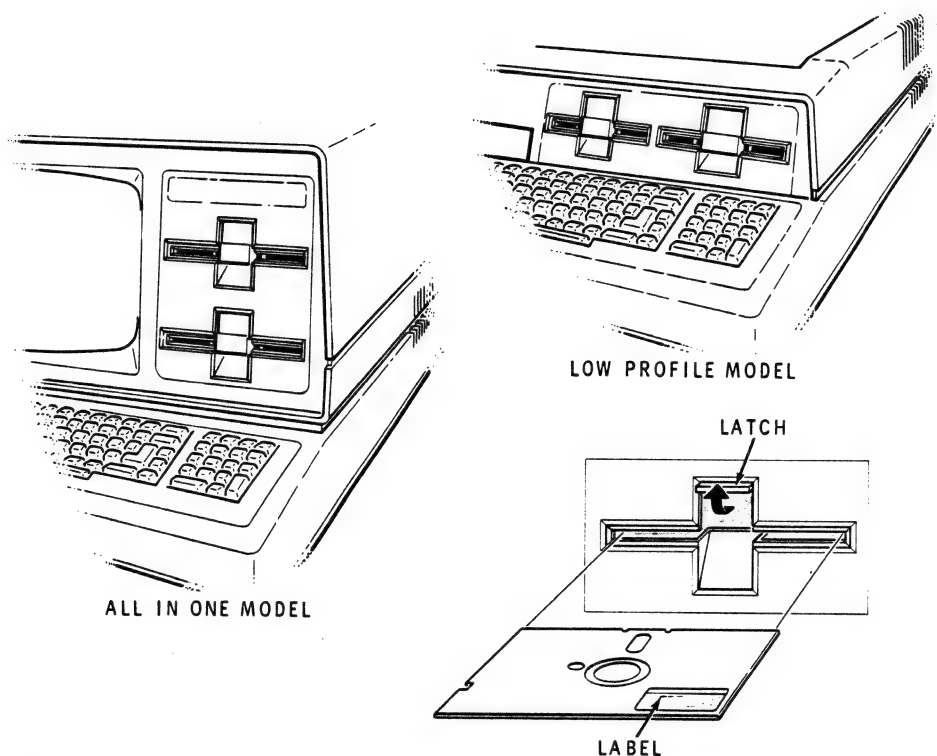


Figure 1.3 Inserting Floppy Disks

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The Operating System

An *operating system* is a computer program that controls both the components of your hardware environment and subordinate programs ("application programs") that perform specific tasks.

It provides a vital link between your keyboard and your application programs, and between your application programs and your peripheral hardware. Thus, it is essential that you use an operating system whenever you use an application program in your microcomputer.

The way that you use the CP/M Operating System is to copy an image of the system from a disk and put it inside the memory of your microcomputer. This activity (called "booting up," or "cold booting") occurs automatically when you power up the computer and insert a disk containing the CP/M Operating System.

CP/M can perform several useful functions when it is alone in your computer's memory, and it also has "hollow" areas into which you can load application programs as you need them.

Operating System Components

The Heath/Zenith CP/M Operating System is divided into two software components: the "system kernel" and the "BIOS file." A disk that contains both of these components is "bootable," which means that it contains an image of the operating system that can be inserted into the computer and used.

The System Kernel

The *system kernel* is a set of programs that reside on the reserved system tracks of a disk. A special data transfer utility (called LDCOPY) is used to copy the system kernel from one disk to another. The system kernel manages files, translates the commands you enter at the keyboard, and performs other functions that do not depend upon specific hardware characteristics.

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The BIOS Files

BIOS stands for Basic Input/Output System, which is the part of the operating system that enables CP/M to work in Heath/Zenith hardware. The BIOS used with this CP/M release is a file called CPM.SYS. The BIOS file can be manipulated by the same methods used to manipulate other files that are stored on the disk.

Operating System Requirements

To use the operating system, you must transfer a copy of it from a disk to the computer by performing an activity called "booting up" or "cold booting." Both the system kernel and the BIOS file *must* be together on a disk for that disk to be usable for booting up.

To protect your software investment, we strongly suggest that you make backup copies of your CP/M distribution software before using it for any practical applications. Once you have made backup copies, your CP/M software will be ready for use in Heath/Zenith hardware. "Software Preparation Procedures" shows you how to start up and back up your CP/M software.

The CP/M Operating System on your distribution software is ready to accommodate a standard configuration of hardware devices. If your hardware configuration differs from these standards, you must adjust the system before it will accommodate all of your devices. Your distribution software includes utilities to help you adjust the system for your devices.

Your CP/M-86 distribution software contains a serial number to prevent the mixing of this software with software from other CP/M distribution packages. Therefore, do not try to use this CP/M system with other CP/M systems or utilities, and do not try to use these utilities with other CP/M systems.

Application Programs

An *application program* performs specific user functions by passing data to the system and reading and processing data from the system.

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Application programs are stored on the file tracks of a disk in units of data called "files." An application program might consist of several files that automatically access each other under certain circumstances. Whenever an application program file is needed to perform a specific task, an image of this file is copied from the disk and inserted into computer memory, where the CP/M Operating System has a reserved "hollow" area for it.

After the application program files have served their purpose, CP/M moves them aside and either reserves its hollow memory areas for new application programs or executes some of the programs within the operating system itself.

An important feature of CP/M-86 is that it supports both 16-bit and 8-bit software. This feature of CP/M-86 permits you to use application programs designed to run within either 16-bit or 8-bit CP/M systems. Thus, the number of application programs you may run under CP/M-86 is greater. In addition, if you are upgrading your system to CP/M-86 from one of Heath/Zenith's earlier versions of 8-bit CP/M, the 8-bit support provided by CP/M-86 will make this process more convenient. A more detailed explanation of how the support design works is included later in this chapter.

Utilities

Your distribution disk contains several application programs that are often referred to as *transient commands* or *utilities* because they provide a number of routine functions that will help you take maximum advantage of your computer system. These programs, are identified by names that end with the file extension "CMD." This extension indicates that these files are valid commands that can execute under CP/M.

Application Program Requirements

It is important to remember that an application program cannot produce the results you desire without the presence of an operating system. Therefore, you must always load the CP/M operating system into your microcomputer before you can use any application program. (Startup Procedure in the Introduction will show you how to put CP/M in your computer.)

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Furthermore, the CP/M Operating System must be capable of controlling all of your hardware devices before any application program can use these devices. Sometimes you must adjust the system (as described in Configure Procedures) so it can control your hardware devices.

Each application program consists of at least one file with a .CMD file name extension. Some application programs also consist of additional files. All of the files included in an application program must be present on a disk within a drive whenever you wish to use the application program.

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CP/M Concepts explains some of the basic properties of the CP/M Operating System and some of the conventions you must follow when using the system. After reading Microcomputer Concepts and CP/M Concepts you should be ready to perform the Software Preparation Procedures.

Specifically, this text shows you how CP/M stores data in units called files, how CP/M accesses these files through disk drives, and how you should issue commands to the CP/M Operating System.

Files

The CP/M Operating System enables you to create, analyze, and manipulate data by storing this data in units called "files." These files are stored on the surface of a disk and given names that conform to CP/M file naming conventions.

When you issue a command that refers to a particular file by name, CP/M goes to the appropriate disk, makes a copy of the file, and puts the copy into one of the hollow areas in computer memory.

CP/M File Naming Conventions

A file name consists of two parts: the primary name and the extension. The primary name has between one and eight characters, and is essential in all file names. The extension can have between one and three charac-

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ters, or it can be omitted entirely. The primary name and the extension are separated by a period (.), in the following form:

`{primary name}.{extension}`

The characters used in the primary name and extension can be any character on the keyboard except the following special characters:

`+ > . , ; : = ? * [ ]`

The following example file names are valid because they conform to CP/M file name conventions:

`memo.doc CPM.SYS PROGRAM.ASM 4/27/81.TXT`

`FORMAT.COM FILE#1 33%-RATE.DAT WSMMSG.S.OVR`

Although the extension is optional, you'll probably find it useful to give your files extensions that somehow describe the type or purpose of the file you are naming. The following list shows several extensions that are applied to files used for a specific purpose:

EXTENSION	FILE PURPOSE
A86	Assembler source file
BAK	Backup file
BAS	BASIC source file
CMD	Command file (executable under CP/M-86)
COM	8080/8085 Command File
H86	Intel HEX object file
INT	Intermediate BASIC file (for BASIC-E,CBASIC)
PRN or LST	Print file of program listing
SUB	A list of commands to be executed with SUBMIT
SYM	Symbol table file
\$\$\$	Temporary work file

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Referencing Several Files at Once (Wild Card File Names)

Many of the commands that you will issue refer to files by name. But when you want to issue the same command for several files with similar names, it is often more convenient to enter a "wild card file name" with the command.

A *wild card file name* represents several file names—much like a "joker" in a deck of cards can stand for any card in the deck. (Wild card file names are sometimes called "ambiguous file names.") A wild card file name contains either asterisks (*), or question marks (?), or both.

An asterisk (*) is entered in place of the entire primary name and/or extension of a file, as shown in the following example:

16MAY82.*

In this example, the asterisk replaces the extension so that this wild card refers to files on the disk with the primary name "16MAY82" and *any* extension.

In the following example, the wild card asterisk takes the place of the primary name:

*.CMD

Therefore, all files with the extension "CMD" and *any* primary name would be referenced.

The wild card *.* stands for *any* file on the disk. (Actually, there are exceptional circumstances under which all of the files on a disk cannot be referenced at one time, but these circumstances will be explained in later text.)

Question marks (?) can be used in a wild card file name to take the place of single characters at fixed file name positions. For instance, the wild card

JOB?.H86

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would refer to any file that has the extension "H86," a primary name with the characters "J," "O," "B," and one or fewer additional characters. Hence the files "JOB0.H86," "JOB1.H86," and "JOBY.H86" are just a few of the files that could be referenced by such a wild card (if these files existed on the disk).

You can use any number of question marks in a wild card (up to 11) and the actual file names referenced will be those with the same characters as those that are explicitly stated in the wild card and any characters in the place of the question mark characters.

Thus the wild card ???????? .CMD will reference any file on the disk with the "CMD" extension—just like the *.CMD wild card.

Disk Drives

A disk drive is a device that transfers data to and from disk storage media.

Drive Names

To allow you to refer to disks and files within your disk drives, the CP/M Operating System recognizes each drive in your hardware environment by a distinct *drive name*. A drive name consists of a letter of the alphabet in the range A through P and a colon (:).

Example drive names are A: B: C: and D:

Default Drive

The *default drive* is the drive to which the system will refer unless you specifically tell the system to refer to a different drive. The default drive is also the drive named in the system prompt, which is displayed when the CP/M system is in control. (Drive A is always the default drive when you boot up, as shown by the A> system prompt.)

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You can execute an application program that is stored as a file in the default drive by typing the primary file name of the application program file (the part without the "CMD" extension) in response to the system prompt, as shown:

```
A>{primary name} RETURN
```

Where A> is the system prompt; and

where {primary name} is the primary name of the file that you want to execute. For this command to be valid, the file must reside on a disk in default drive A and have a "CMD" extension.

If the file represented by {primary name} does not reside on default drive A, then the system will display a message repeating your unfound entry with a question mark, as shown:

```
A>{primary name} RETURN  
{primary name}?
```

This kind of error message will also occur if you use improper syntax in your entry or misspell your entry.

Changing the Default Drive

You can change the default drive by typing the name of another drive and pressing RETURN at the A> prompt, as shown:

```
A>B: RETURN
```

Such an entry will produce a new system prompt, indicating that drive B: is now the default drive, as shown:

```
A>B:  
B>
```

NOTE: Any drive that is changed to the default drive in this fashion must be a valid drive within your hardware environment, and it must contain a floppy disk prepared by the FORMAT program. When you switch default drives in this fashion, the CP/M system will assume that any application program you wish to execute should be found on a disk in the new default drive.

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Accessing a Non-Default Drive

A *non-default drive* is a disk drive whose name is not displayed in the system prompt. For instance, if the A> system prompt is displayed (meaning A is the default drive), then your non-default drives are any valid drives with names "B" through "P."

When you want to execute an application program that resides on a disk in a non-default drive, type the name of the appropriate non-default drive and a : (colon) immediately before the program's primary name and before you press RETURN:

```
A>B:{primary name} RETURN
```

Where A> is the system prompt;

where B: is the name of the desired non-default drive; and

where {primary name} is the primary name of the file that you want to execute. The file must reside on a disk in non-default drive B: and have a "CMD" extension.

The CP/M system would respond to such an entry by "logging-in" disk B to get the application program indicated by {primary name}, inserting an image of this program into computer memory, and executing the program.

Switching Floppy Disks Between Drives

When you reference a floppy disk drive (by entering a command at a default drive, by changing default drives, or by logging in a non-default drive with a command), CP/M remembers some of the characteristics of the disk in the referenced drives. Switching disks between drives can cause problems unless you tell the system to forget the old characteristics.

You can make the system forget about old disk characteristics by performing a "warm boot" (by holding down the CTRL key and pressing the C). This entry is often abbreviated as CTRL-C, and it must be entered in response to the A> system prompt. It tells the operating system to forget what it knows about the disks that were logged in the drives and to log in (or, look at) the new disks. Then it redisplay the system prompt.

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We suggest that you perform a warm boot whenever you remove a disk from a drive and replace it with another disk (unless the system or an application program prompts you to insert a different disk).

Using CP/M With One Drive

When you enter a valid command that requires more disks than you have physical drives, CP/M displays prompts that instruct you to insert the required disks into the physical drive at the appropriate time. The prompts appear in the form:

```
PUT DISK x IN DRIVE y: AND PRESS RETURN
```

Where *x* is the logical name that is assigned to a particular disk for the duration of the operation; and

where *y*: is the physical name given to the single drive, which is temporarily set to read data from or write data to a particular disk.

When such a prompt appears, you should remove the disk that is already in the drive, insert the disk that the prompt indicates, and press RETURN. Execution of the program will resume until the drive needs to write data to or read data from a different disk. Then a similar prompt will appear, requesting that you insert a different disk into the drive.

You do not have to perform a warm boot after switching disks in this manner. However, you must keep track of which disk is which. If you insert the wrong disk, the required data will not be found and you might have to restart the operation.

Commands

In general, a command is a program that can help you to create, change, analyze, or move data. Commands are entered in response to a "system prompt."

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A system prompt consists of the letter for the default drive and the greater than (>) character. When you start up CP/M, the system prompt is displayed on your screen, as shown:

A>

The system prompt tells you that CP/M is ready to receive a command in the form of a "command line."

Command Lines

A command line is the form of response you make to the system prompt to bring up, or "enter," a command. A command line usually consists of three components: the "function," the "argument(s)," and the RETURN. The function is entered first, and it indicates the activity that will be performed. The first argument is entered one space after the function. The argument indicates what data (files, systems, disks, drives, etc.) the function's activity should be performed upon. Each argument that follows is separated by one space from the preceding one. After entering the function and argument, you must press RETURN to tell CP/M that the entire command line is ready for execution. A command line can contain a maximum of 127 characters.

You will enter command lines in the following form:

A>{function} {argument} {argument}... RETURN

Where A> is the system prompt;

where {function} is mandatory for all commands;

where {argument} {argument}... is optional for some commands; and

where RETURN is mandatory for all commands.

Always separate the command line function and the command line argument with one space. Furthermore, any command entered at a prompt that includes the ">" character must end with a RETURN. However, commands themselves often display prompts as well. And when such a prompt ends with a colon (:), a RETURN is usually not required for CP/M commands and utilities.

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NOTE: In this text, when you are to press the RETURN key the instruction will be listed as **RETURN**.

There are two kinds of commands that can be executed in a CP/M operating environment: Resident Commands and Transient Commands.

Resident Commands

Resident commands reside within the CP/M Operating System. Therefore, CP/M doesn't have to refer to a disk to know how to execute these commands—although the commands themselves might affect data that are stored on a disk.

The CP/M Operating System contains the following resident commands:

- | | |
|-------------|--|
| DIR | Displays the names of files without a SYS attribute that reside on a disk. |
| DIRS | Displays the names of files with a SYS attribute that reside on a disk. |
| ERA | Erases specified files from a disk. |
| REN | Renames a specified file on a disk. |
| TYPE | Displays the contents of a file on the terminal. |
| USER | Enables you to divide the space on a disk into separate areas for different users, to display the current user assignments, and to change those assignments. |

This list shows only the command line function of the resident commands. See the "User's Guide" for a comprehensive explanation of the arguments used when these commands are entered.

Transient Commands

Transient commands are application programs that are supplied with the CP/M Operating System on your CP/M distribution software. These application programs help you to manipulate the operating system and to perform several other useful microcomputer activities.

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These commands (also known as “utilities”) are stored on the disk as files with the “CMD” extension. When you issue a command that makes reference to one of these files, CP/M copies an image of this file from the appropriate disk, puts this image into one of CP/M's hollow areas inside the computer memory, and begins execution of the transient command.

BIOS Source Files

One of your Distribution Disks contains the source code files used to produce CPM.SYS. These files are supplied for the benefit of assembly language system programmers, and they will not be needed by most customers. Many of the files on this disk are written in 8086 assembly language and require ASM86 for assembly.

Support of 8-Bit Software

Although a 16-bit operating system, CP/M-86 is designed to also support 8-bit software. Briefly described, this feature works by first looking for a 16-bit version (indicated by the filename extension .CMD) of the program whose name has been entered at the system prompt. If a 16-bit version of the program is not found, the system then searches the logged drive for an 8-bit version (indicated by the filename extension .COM).

In more detail, the search for and execution of the correct program proceeds in the following steps:

1. A filename is entered at the system prompt (e.g., A>16-BIT or A>B:16-BIT).
2. The system searches for an internal CCP command (such as the resident commands REN or ERA); if the system does not find one that matches the filename,
3. the system searches for a file xx.CMD (e.g.16-BIT.CMD) in the current user; if the system does not find one that matches the filename,
4. the system searches for a file xx.CMD (e.g., 16-BIT.CMD) with a system attribute in User 0.

If the system still does not find the correct file, it ends its search for a 16-bit version of the program and begins to search for an 8-bit version.

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5. The system searches for a file `xx.COM` (e.g., `8-BIT.COM`) in the current user; if it does not find one that matches the filename,
6. the system searches for a file `xx.COM` (e.g., `8-BIT.COM`) with a system attribute in User 0.

When a file `xx.COM` is found, the program is loaded into a free 64k bank of memory and the 8085 processor is started. An interface is automatically provided between the 8-bit program and CP/M-86. The program is then executed.

While CP/M-86 supports many 8-bit programs, there are a few restrictions you should be aware of if you plan to use the system's dual capacity on a regular basis.

1. At program termination, there is no automatic reset of the BDOS disk subsystem. This means that you cannot, for example, switch disks in a drive without pressing CTRL-C to perform a warm boot.
2. 8-bit programs that modify the operating system and stay resident (e.g., `XSUB` and `DESPool`) will not function.
3. BDOS and BIOS calls that return the address of tables, return a pointer to a copy of the table. Three tables are supported: 1) disk header table, 2) disk parameter table, 3) allocation vector. You should note, however, that only one copy area is provided for each type of table.
4. Only the standard Digital Research BDOS and BIOS entries are supported. This does not include any Heath/Zenith extensions.

Command Line Entry

CP/M is very precise in the form it expects command lines to have. You must spell all components of a command line correctly and include the names of non-default disk drives whenever a referenced file is not on the default disk. If you don't, CP/M will not be able to execute your command and will respond by redisplaying the invalid command line with a question mark (?). However, CP/M does allow some flexibility in the way you may respond to the system prompt, as the following special entry explanations show.

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Command Editing Keys

NOTE: In this text, "CTRL" followed by a hyphen and a letter (CTRL-S, CTRL-C, CTRL-P for example) indicates that you should hold down the key marked CTRL (control key) while pressing the key marked with the letter.

The following list explains the single keys and combinations of keys that you can press to edit a command line before submitting it to CP/M for execution.

DELETE Removes the previous character typed from the command line. Depending on how your operating system is adjusted, the removed characters might be echoed (repeated in reverse) on the screen, or erased from the display.

BACK SPACE Removes the previous typed character. Also removes any deleted characters that were echoed in the line immediately to the left of the cursor.

CTRL-H Same as BACK SPACE.

CTRL-X Removes all characters typed in the command line, as if you used BACK SPACE all the way to the beginning of the line.

CTRL-U Effectively removes all characters typed in the command line and allows you to try again on the line beneath the old line. It leaves the display of the old command line on the screen, and displays the "#" character at the end of this old line to label it as a nullified entry.

CTRL-R Redisplays the edited version of a command line below the "scratch pad" version of the line without any of the deleted characters that might have been echoed in the line. Also displays the # character at the end of the "scratch pad" version.

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Command Entry and Display Keys

The following list explains the single keys and combinations of keys that you can press to end a command line and submit it to CP/M for execution:

RETURN Ends the command line, sends the command to the system for execution, and displays nothing on the screen. After execution of the command, CP/M redisplay the system prompt. In this manual, the RETURN will often be used in examples and instructions to remind you to make this entry at the end of a command line.

LINE FEED Same as RETURN.

CTRL-J Same as RETURN.

CTRL-M Same as RETURN.

CTRL-E Enables you to see the entire display of a command line that is longer than your screen is wide. When you type this entry, the remaining portion of your command line will be displayed at the left-hand end of the next screen line.

This entry will not send your command line to the system for execution (as a RETURN entry would). It is not essential that you enter CTRL-E when typing a command line that exceeds console display range because CP/M will process your command line even if it does not fit on one screen line.

Even if you type CTRL-E entries, a command line cannot exceed 127 characters in length. If you type a 128th character in a command line, CP/M will automatically interpret it as a carriage return and try to execute your command line based upon the first 127 characters.

The following entries enable you to enter comments that CP/M will ignore:

; (semicolon) Enables you to enter comments not intended for execution without receiving error feedback from CP/M. Comments can consist of any characters you wish, typed after the “;” entry, and followed by a RETURN or “CTRL-J” or “CTRL-M.”

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: (colon) Same as ; except that you should not begin a comment line with two consecutive colons.

Cursor Movement Keys

The following entries enable you to rapidly skip several spaces in a command line or comment:

TAB As with a regular typewriter, this key enables you to advance several spaces without pressing the space bar several times. It skips to the eighth column of the console display range or to some column numbered by a multiple of eight. Hence if you enter a TAB at the beginning of a command line, you will skip six columns (because the system prompt takes up two columns). If you immediately enter another TAB, you will skip an additional eight columns, and so forth.

CTRL-I Same as TAB.

Command Execution Keys

The following list explains the single keys and combinations of keys that you can press to change the way in which CP/M executes your command line:

CTRL-S Interrupts the display of data on the screen when it is pressed once. It allows CP/M to resume data display when pressed a second time. This entry is useful when data scroll by too quickly for you to read them. CP/M will resume data scroll when any other key is pressed or CTRL-S is pressed a second time.

CTRL-P This entry after the system prompt causes CP/M to send most of the output it displays to the list device (LST:) at the same time. (The list device is usually a printer.) Pressing CTRL-P a second time will stop the display to the list device. This entry is useful when you want to record on paper the displays that appear during the execution of a command.

NOTE: CTRL-P should not be entered unless your printer (or other LST: device) is connected, turned on, and properly configured (see CONFIGUR on page 66).

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Software Preparation Procedures

Following are procedures for preparing your CP/M software so that it works efficiently with your hardware:

- **Startup Procedure** Helps you to prepare your microcomputer hardware for use and to load the CP/M Operating System into your microcomputer.
- **Backup Procedures** Helps you to copy and customize your CP/M distribution software onto backup and working disks to protect your software investment.

Startup Procedure

This procedure will explain the sequence of steps necessary for loading and running CP/M. This sequence includes the preparation of your hardware devices, the insertion of a bootable disk into the appropriate drive, and the movement of a copy of the CP/M Operating System from a disk into your microcomputer's memory.

The most significant step in this sequence is the movement of CP/M from a disk into the microcomputer's memory. This step is known as "booting up" or "cold booting." You will perform this step at least once each time you use CP/M in your microcomputer. Once loaded into memory, CP/M can control an application program or perform one of the many tasks within its own repertoire.

This procedure consists of several steps to help you start up CP/M in your Z-100 microcomputer. After you have unpacked your computer and connected any peripheral device to it according to the procedures given in the Z-100 Series User's Manual, proceed with the following steps.

NOTE: Your Z-100 computer is equipped with an automatic bootup feature. When your Z-100 is shipped, this feature is set to boot up immediately when the computer is powered up or after it is reset. Therefore, a manual bootstrap command is not necessary during the startup procedure. For more information about booting up see the Z-100 User's Manual.

1. Make certain that the power cords and transmission cables to all of your hardware devices are securely plugged into the proper receptacles. (Refer to the manual of each hardware device for assistance.)

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Software Preparation Procedures

2. Turn on the power switches to all of your hardware devices. Within a few seconds, the red light on your drive will glow.
3. Place CP/M Distribution Disk I into the left-hand drive (if you have a Low-Profile Z-100) or into the upper drive (if you have an All-in-One Z-100), and close the drive door.

Within a few more seconds, a CP/M-86 identification message and system prompt will be displayed in a form similar to the following:

```
CP/M-86 VERSION x.xx 07/07/82
```

```
A>
```

You have successfully booted the CP/M-86 Operating System. The A> system prompt indicates that the system is waiting for you to enter a command. Proceed to "Backup Procedures."

NOTE: If a message and prompt in this form do not appear, take one of the following steps:

- If nothing appears on the screen, hold down the **CTRL** key while pressing the **RESET** key to reset the computer. The bootup procedure should resume automatically and cause display of the message and prompt.
- If a pointing finger prompt appears on the upper left-hand corner of the screen, then the automatic bootup attempt was aborted. You must now enter a manual bootup command, as explained in the Z-100 User's Manual. (In general, manual bootup can be performed by pressing the **B** key and then **RETURN**.)
- If these steps continually fail to produce any screen display, refer to the section entitled "In Case of Difficulty" in the Z-100 User's Manual.

Backup Procedures

Before beginning regular use of your CP/M system, you should protect your software investment by making two exact copies of the distribution disk set. After this is done, the distribution disks should be permanently stored in a secure location.

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Software Preparation Procedures

One copy of the distribution set will become your master set. It should be kept in a safe but accessible location and should be used to create all future working copies of the CP/M system.

The second copy of the distribution set will become your working copy. It should be stored near your computer system and should be used for routine daily operations. Since floppy disks can be damaged during use and do eventually wear out, you should expect to create new working disks from your master set from time to time.

These backup procedures can be used whether your computer has a single floppy disk drive or multiple floppy drives. You will need six blank disks that are not write-protected. Follow these steps:

1. Carefully read the instructions for using the FORMAT utility on page 91 of this manual. Following these instructions, FORMAT all six of the blank disks using the double-sided option.
2. Carefully read the instructions for using the COPYDISK utility in Part II, the "User's Guide." Following these instructions, copy distribution disk I to two of the blank disks. Then copy distribution disk II onto two more blank disks. Finally, copy distribution disk III to the remaining two disks.

You will probably find it desirable to transfer the CP/M-86 Operating System and/or certain utility programs to the disks containing your application software. This can be accomplished using the LDCOPY utility (see Part I) and the PIP utility (see Part II).

UTILITIES

ASSIGN

The Utility that Assigns Winchester Partitions to Drives

The ASSIGN utility enables you to access data from Winchester disk partitions by assigning the partitions to drives, or by changing partition drive assignments. ASSIGN can also identify all of the partitions on a Winchester disk, and identify which of these partitions are currently assigned to a drive name.

Winchester Disk Partitions

A partition is an area on the surface of a Winchester disk that performs as though it were a floppy disk drive during most CP/M operations. Two partitions are already established on your Winchester disk when it is shipped from the factory. Both of these partitions can be made accessible at one time, provided they have been formatted with either CP/M-85 or CP/M-86.

Partitions are identified by a partition name that consists of one to 16 characters, and optionally an operating system name that consists of 10 characters.

Although one partition is accessible as soon as you boot up to the Winchester disk, you can access no other partition until you run the ASSIGN utility to assign the second partition to a drive name. If you boot on a floppy, both partitions must be assigned.

NOTE: If you have repartitioned your Winchester with the PART utility (see Winchester User's Supplement) to contain more than two partitions, you are still limited to having a maximum of two partitions accessible at one time.

Assigning Partitions = Inserting Disk

For most CP/M operations, you can think of a Winchester partition as if it were a floppy disk. However, you must also realize that the ASSIGN activity is similar to the fundamental activity of inserting a floppy disk into a drive.

You must *insert* a floppy disk into a drive before its data can be accessed. Likewise, you must *assign* a partition to a drive before its data can be accessed (unless you booted up to the partition).

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ASSIGN

Inquiry of Available Partitions

To find out the names of *all* of the partitions on the Winchester disk, enter the following command:

```
A>ASSIGN ? RETURN
```

ASSIGN will respond with a display in the following form:

PARTITION NAME	OS NAME	SIZE
-----	-----	----
CPM-BUSINESS	: CPM	3200k
CPM-WORDPROC	: CPM	2860k
CPM-PROGRAMS	: CPM	2020k
Z-DOS1	: Z-DOS	1600k

Where the characters listed beneath "PARTITION NAME" are the partition names that were designated for each partition when the PART or PREP utility was run;

where the characters listed beneath "OS NAME" are the operating system names that were designated for each partition when the PART or PREP utility was run; and

where the numbers listed beneath "SIZE" show the total capacity (in kilobytes) of the partition named to the left. This capacity includes usable file space and space that might be occupied by an operating system or by bad sectors. (To determine the amount of usable file space that is free on a partition for future files, use ASSIGN to assign that partition to a drive and run the STAT utility.)

NOTE: The partitions listed in this display may or may not be assigned.

Inquiry of Current Assignments

To find out the names of the partitions on the Winchester disk that are currently accessible through a drive name, enter the following command:

```
A>ASSIGN RETURN
```

The ASSIGN utility will display equations to indicate which drive names can be used to access which partition names, as in the following example:

UTILITIES

ASSIGN

A: = CPM-WORDPROC; CPM
B: = CPM-PROGRAMS; CPM

When you boot up to a Winchester disk partition, that partition is automatically assigned to drive A, and a different partition can be assigned to drive B using the ASSIGN utility.

Assigning Partitions to Drive Names

To assign a partition to a drive, enter a command in the following form:

```
A>ASSIGN {d}:={partition name};{system name} RETURN
```

Where {d} is the drive to which you wish to assign the partition;

where {partition name} is the partition name of the established partition you wish to assign. Partition names contain 1-16 ASCII characters excluding the semicolon, space, and tab. This entry is mandatory in a drive partition assignment command;

where ; is a semicolon that must be used as a separation character only when you also specify a system name; and

where {system name} is the operating system name of the established partition you wish to assign. Operating system names contain 1-10 ASCII characters excluding the semicolon, space, and tab. The operating system name is an optional entry. You only need to specify it if the specified {partition name} matches that of another partition on the disk.

NOTE: The {partition name} and {system name} are both components of the "bootstring," which must sometimes be specified in bootup commands.

For example, you can assign the partition named "CPM-PROGRAMS;CPM" to drive B with the following command:

```
A>ASSIGN B: =CPM-PROGRAMS; CPM RETURN
```

Furthermore, if you have only one partition on the disk with the partition name "CPM-PROGRAMS," you can omit specification of the operating system name in the command, as shown:

```
A>ASSIGN B: =CPM-PROGRAMS RETURN
```

UTILITIES

ASSIGN

Valid Assignment Commands

A maximum of two Winchester disk partitions can be assigned to drive names at one time, regardless of how many partitions have been established on the disk.

The drives to which you can assign a partition vary, depending upon the type of media you use to boot up and the types of drives you have in your hardware environment. The following table shows which forms of partition assignment commands you can enter depending upon your bootup media and upon which kind of disk drive you might have. (The command forms indicated in this table use the variable {partition name};{system name} to represent the partition you wish to assign.)

Bootup Media	Additional Drives	Valid Assignment Commands
5.25-inch floppy disk	with any 8-inch floppy drives	A>ASSIGN E:={partition name};{system name} RETURN A>ASSIGN F:={partition name};{system name} RETURN
5.25-inch floppy disk	with no 8-inch floppy drives	A>ASSIGN C:={partition name};{system name} RETURN A>ASSIGN D:={partition name};{system name} RETURN
8-inch floppy disk	with any 5.25-inch floppy drives	A>ASSIGN E:={partition name};{system name} RETURN A>ASSIGN F:={partition name};{system name} RETURN
8-inch floppy disk	with no 5.25-inch floppy drives	A>ASSIGN C:={partition name};{system name} RETURN A>ASSIGN D:={partition name};{system name} RETURN
Winchester partition	not applicable	*A>ASSIGN A:={partition name};{system name} RETURN A>ASSIGN B:={partition name};{system name} RETURN

*When you boot up with a Winchester partition that contains the CP/M-86 Operating System, this partition is automatically assigned to drive A.

UTILITIES

ASSIGN

Assign Error Messages

BAD PARTITION NAME

EXPLANATION: This error occurs if you try to assign a valid drive name to an invalid partition name, or if you made a syntax error during command entry. To correct this, you must reboot and re-enter any assignments made.

BAD DRIVE NAME

EXPLANATION: This error occurs if you boot up on a Winchester and try to assign a drive name other than A or B to a Winchester disk partition. You must re-enter assignment commands.

PARTITION ALREADY IN USE

EXPLANATION: This error occurs if you try to assign a new drive name to a partition name that already has an assigned drive name. The assignment of a currently assigned partition must be removed before a new drive name can be assigned to that partition.

BAD OPERATING SYSTEM NAME

EXPLANATION: This error occurs if you try to assign a partition name with an invalid operating system name to a valid drive name. This assignment should be attempted again with an operating system name that helps to identify an existing partition.

INCORRECT VERSION OF BIOS

EXPLANATION: The operating system being used will not accommodate Winchester disk partitions.

DISK READ ERROR

EXPLANATION: The operating system failed in an attempt to read from the Reserved Winchester Area (see text on PREP). Use VERIFY utility. If this error message occurs again, contact Zenith Data Systems Technical Consultation for assistance.

UTILITIES

BACKUP

The Utility that Facilitates File Copying from Working Disks and/or Partitions to Backup Storage Media

The BACKUP utility enables you to conveniently copy large quantities of files from disks or partitions.

BACKUP is especially beneficial to Winchester disk users, because Winchester disk partitions hold so many files.

Because BACKUP works with both floppy disks and Winchester partitions, this text refers to recording media as "partition/disk" or "disk/partition" wherever it would be practical for you to use either a floppy disk or a Winchester partition.

BACKUP's function is complementary to the function of the RESTORE utility, which can return backed up files to their original media.

NOTE: The disks that receive backed up files in a BACKUP operation must be formatted. Therefore, before using BACKUP, you should determine how many disks will be necessary to receive the backed up files. (The STAT utility can be useful in determining the size of the files you wish to back up.) Then you must use the FORMAT utility to prepare each of the necessary disks.

Backup Operation

When the BACKUP utility copies files from a source partition/disk, it temporarily concatenates them to be stored as a single "backup file" on the destination media. Thus the backup file is a long, continuous string of data including individual files that are joined by BACKUP and separated by RESTORE. The backup file also contains a directory that lists all of the individual files in the exact sequence they were copied.

However, the backup file might be much larger than the capacity of your destination media. For instance, if the source in a BACKUP operation is a large Winchester disk partition and the destination is a 5.25-inch floppy disk drive, then the backup file will likely overflow the capacity of a single floppy disk.

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BACKUP

Therefore BACKUP is capable of storing parts of the backup file on more than one disk. BACKUP accomplishes multidisk storage by recording up to the absolute capacity of the destination media, prompting you to insert another disk, and then continuing to copy from where it left off. With this capability, BACKUP can even divide an individual file within the backup file between two or more disks.

The backup file's directory keeps track of the number of disks that were necessary to receive the entire backup file. In this directory, each of the disks used is numbered as a "volume."

The disk volumes used to receive the backup file are collectively called the "backup disk set."

The BACKUP and RESTORE utilities also enable you to view several statistics, such as the names of the files within a backup file, by entering special command line options.

NOTE: If you are performing a BACKUP operation from a floppy disk to a Winchester disk, the "backup disk set" can consist of only one partition. You will not be able to back up files to more than one partition during this operation—even if more than one formatted CP/M partition is already assigned to a drive name. Therefore, if you wish to back up files to a Winchester disk partition, you should make certain that this partition has enough free space to accommodate all of the backup files. Use the STAT utility to determine the size of the files to be backed up and the amount of free space on the partition.

Starting Backup

You can use the BACKUP utility through either of the following methods: the Utility Prompt Method and the System Prompt Method. Both methods enable you to use optional switches that provide more control of what is backed up.

Utility Prompt Method

With this BACKUP method, you invoke the BACKUP utility from a disk by entering the command function at the system prompt and then entering the command argument at a prompt displayed by the BACKUP utility.

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BACKUP

The first entry under this method is in the following form:

A>BACKUP RETURN

After an entry in this form, BACKUP will display a message and prompt in the following form:

BACKUP Version X.X.XXX
Copyright (c) 1983 Zenith Data Systems

>>

NOTE: The version number of the BACKUP utility might vary.

At the >> BACKUP prompt, you should enter a command line argument in the following form:

>{d}:{destfile}={s}:{sourcfile},{s}:{sorcfile},... [{x};{x}:...] RETURN

Where >> is the BACKUP utility prompt;

where {d} is the optional name of the drive that is to receive the copies being transferred. This specification is necessary only if this destination drive is not also the default drive;

where {destfile} is the primary name of the backup file, which you wish to contain all of the individual files copied in this operation;

where {s} is the optional name of the drive from which files are being copied. This specification is necessary only if this source drive is not also the default drive;

where {sorcfile} is the complete name of each file, separated by commas, that you wish to back up from the source partition/disk. You can enter wild card file names (using the * and ? characters); and

where {x} is any of the optional single-letter options, separated by semicolons, that structure the BACKUP operation.

NOTE: A space is allowed, but not necessary, between the source file specifications and the options.

UTILITIES

BACKUP

When BACKUP has completed the specified operation, it will redisplay the > BACKUP prompt. You can continue entering command line arguments at BACKUP prompts indefinitely.

The BACKUP utility will display the names of each file that it copies in a vertical list, during the BACKUP operation.

When you wish to exit from the BACKUP utility to the CP/M system, press RETURN at a BACKUP prompt. Then CP/M will display the A> system prompt.

NOTE: Like all command lines entered through the CP/M system, the BACKUP command line can contain only 127 characters. If your command line is between 78 and 127 characters in length, you can keep the entire line visible on your video screen by pressing **CTRL-E** after the 79th character.

System Prompt Method

With this BACKUP method, you enter the command line function and the command line argument both at the system prompt, in the following form:

```
A>BACKUP {d}:{destfile}={s}:{srcfile},{s}:{srcfile},...[{x};{x};...] RETURN
```

Where BACKUP is the command line function, stored in the file BACKUP.COM on the default or logged partition/drive;

where {d} is the optional name of the drive that is to receive the copies being transferred. This specification is necessary only if this destination drive is not also the default drive;

where {destfile} is the primary name of the backup file that you want to contain all of the individual files copied in this operation;

where {s} is the optional name of the drive from which files are being copied. This specification is necessary only if this source drive is not also the default drive;

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BACKUP

where {srcfile} is the complete name of each file, separated by commas, that you wish to back up from the source partition/disk. You can enter wild card file names (using the * and ? characters); and

where {x} is any of the optional single letter options, separated by semicolons, that structure the BACKUP operation.

NOTE: A space must be entered between the BACKUP command line function and the drive and/or file name specifications. A space is allowed, but not necessary, between the source file specifications and the options.

During the BACKUP operation, the BACKUP utility will display the names of each file that it copies in a vertical list.

After BACKUP has completed the specified operation, CP/M will display the A> system prompt.

NOTE: Like all command lines entered through the CP/M system, the BACKUP command line can contain only 127 characters. If your command line is between 78 and 127 characters in length, you can keep the entire line visible on your video screen by entering **CTRL-E** after the 79th character.

Help Display Method

With this BACKUP method, you enter the command line function and a ? (question mark) at the system prompt, as shown:

```
A>BACKUP ? RETURN
```

This command will cause the display of messages that summarize the purpose, command line, and options of the BACKUP utility. The system prompt will appear below the BACKUP display.

This invocation method does not back up files. It is designed to provide you with a convenient quick reference to a few aspects of the BACKUP utility.

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BACKUP

BACKUP Sources

A BACKUP command line can include one or more sources. When specifying sources, you must always specify a file, and sometimes a drive.

The source files specified in a BACKUP command line should be identified by complete file names, including the primary name (1-8 characters) and the extension (1-3 characters if used).

Whenever a specified source file does not reside on the default drive, a drive name should be specified in front of it. You can back up files from any valid drive during a BACKUP operation.

Wild card, or ambiguous, file names can be specified, using the * or ? wild card characters. (Wild card file names can be particularly useful when you have many files to copy, because a command line can contain a maximum of only 127 characters.)

Any number of source file names can be specified in a command line (as long as the limit of 127 characters per command is not exceeded). However, if two or more source file names are specified, they must be separated by commas.

NOTE: The number of source files that can be backed up in a single BACKUP operation is limited by the amount of space on the first disk/partition used to receive the backup volumes. This disk/partition must have enough free space to accommodate the entire backup file directory. The backup file directory is described in "Structure of Backup Files."

A source file specification is required in all BACKUP command lines except those entered with the [B] or [L] option. The purpose of the [B] option is to display characteristics of all of the master backup files on disk. The [L] option displays a list of the individual files within a backup file.

The source file specification

`*.ASC,TEST?,C:*. *`

would cause copies to be made of all files on the default drive with an .ASC extension; all files on the default drive that are five characters long beginning with TEST and that have no extension (such as TEST0, TEST1, TESTS, TESTY, etc.); and all files on drive C.

UTILITIES

BACKUP

To further demonstrate the characteristics of source file specifications:

A: DEMO.* B: SYSTEM.COM E: 82*.DOC ???? .DAT

would cause copies to be made of all files on drive A with DEMO as primary name and any extension; the file SYSTEM.COM on drive B; all files on drive E that have a primary name beginning with 82 and that have a .DOC extension; and all files on the default drive that have a four-letter (or less) primary name with a .DAT extension.

NOTE: If any of the source files you specify are random files (as opposed to sequential files), these files might become larger when restored with the RESTORE utility.

BACKUP Destination

A BACKUP command line can include only one destination. When specifying this destination, you must always specify the primary name of a file and sometimes specify a drive.

The file specified as the destination will ultimately become the backup file that will contain all of the individual files that are copied.

The destination file specified in a BACKUP command line should be identified by a primary file name only (1-8 characters). The extension should not be specified, because BACKUP applies extensions to the backup file automatically. (BACKUP will apply the extension "000" to the first backup file volume, "001" to the second, "002" to the third, etc.)

Wild card file name characters (* or ?) cannot be used to specify a destination file.

Whenever a specified destination file does not reside on the default drive, a drive name should be specified in front of it. You can back up files to any valid drive during a BACKUP operation.

NOTE: However, if your destination drive is assigned a partition, you will only be able to create one backup file volume. If the files you wished to back up will not fit on this volume, then you will have to abort the BACKUP operation.

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A destination file specification is required in all BACKUP command lines except those entered with the [B] option, for the sole purpose of displaying characteristics of all of the master backup files on the default disk.

Consider an example where the primary file name "C:QUITTIME" was entered as the destination in a command line. The ensuing BACKUP operation required that five disks (backup file volumes) be inserted into drive C to accommodate all of the source files.

The resulting set of destination disks (backup file volumes) would contain the following backup files:

QUITTIME.000
QUITTIME.001
QUITTIME.002
QUITTIME.003
QUITTIME.004

The file "QUITTIME.000" would be the master backup file volume, which contains the backup file directory.

BACKUP Options

The BACKUP utility enables you to structure any backup operation by specifying the following options in a command line:

- B** Backup directory—displays a directory listing statistics about all master backup files.
- D** Date stamping—applies today's date to the directory of individual files within a backup file.
- E** Exception files—exclude exception files from backup operation.
- L** List directory—list the directory of the backup files.
- Q** Query each—query yes or no on each file before backing up.
- S** System files—include system files in the backup.

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U User number—backup files from specified user area(s).

V Verify—verify the file after backup operation.

Switches are always the last items specified in a BACKUP command line. They must be enclosed within square brackets and separated by semicolons when more than one is used.

If a switch requires specification of files, then the option letter should be separated from these file specifications by a colon. When more than one file specification is necessary within a single option, then the file specifications should be separated by commas.

Options are entered in the following form:

`[{x};{x}:{details},{details},{details};{x};...]`

Where `{x}` is an option letter;

where `{details}` are additional character strings (such as the date, file names, or user numbers) that must be specified with some options;

where the `[ ]` square brackets must enclose the options;

where the `;` (semicolon) must separate multiple options;

where the `,` (comma) must separate the file names and/or user numbers used with some options; and

where the `:` (colon) must separate some option letters from accompanying `{details}`.

B—BACKUP Directory

The B option causes a directory display listing statistics about all of the master backup files (those backup files with the "000" extension) on a specified disk.

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This directory lists the primary name of each master backup file, the number of volumes in the backup set that begins with each master, the number of files in each set of backup files, and the date of each backup operation.

Only the drive containing the master backup file(s) needs to be known in command lines entered for the sole purpose of producing a B option directory. Therefore, specify this drive in the command line unless it is the default drive.

You can use the B option in commands of the following form:

```
A>BACKUP {d}: [B] RETURN
```

Where **BACKUP** is the command line function, stored in the file **BACKUP.COM** on the default or logged partition/drive;

where **{d}** is the optional name of the drive that has received the copied files and stored them within backup file volumes. This specification is necessary only if this destination drive is not also the default drive; and

where **[B]** is the single-letter option that causes the display of master backup file features.

The B option may be used with both methods of invoking backup. For example, from the CP/M system prompt:

```
A>BACKUP C: [B] RETURN
```

or the same operation from the **BACKUP** utility prompt:

```
>C: [B] RETURN
```

The B directory listing would appear in the following form:

Name	Volumes	Files	Date
QUITTIME	3	117	04-27-83
SAVEME	1	48	10-24-82
STORAGE	5	231	02-30-84

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D—Date Stamping

The date option enables you to specify the date for this BACKUP operation within the command line, without having to answer a date prompt. This date will appear in the displays caused by the B option. Specify the date option and date string in either of the following forms:

[D:{mm}-{dd}-{yy}]

[D:{mm}/{dd}/{yy}]

Where {mm} is a one- or two-digit entry for the month, within the range 1-12;

where {dd} is a one- or two-digit entry for the day of the month, within the range 1-31;

where {yy} is a one- to four-digit entry for the year, within the range 0-9999; and

where either - (hyphens) or / (slashes) can be used to separate month from day and day from year, although - (hyphen) will always appear in the dates of the display produced by the [B] option.

If you do not specify the D option, then BACKUP will prompt you to specify the date during each BACKUP session in which you specify both source and destination.

If you do specify the D option in a command in which both source and destination are specified, BACKUP should begin to copy individual files, displaying the drive name, file name, and user area number of each individual file as it is copied, in the following form:

E: FILENAM1.EXT from user 9

E: FILENAM2.EXT from user 9

E: FILENAM3.EXT from user 9

.

.

.

E: FILENAMn.EXT from user 9

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E—Exception Files

The BACKUP operation takes place for all of the files except that file given as an exception file. The file listed with the E option is then ignored during the operation. The E option is entered in the following form:

`[E:{filespec},{filespec}]`

Where E is the option;

where {filespec} represents files that are to be excluded from the operation. If a file being excluded does not reside on the default drive, then you must also specify the name of the drive that contains it. Ambiguous file names (with * or ? wild card characters) can be specified; and

where the , (comma) and : (colon) are required separation characters.

For example:

```
A>BACKUP BACK1=*.DAT [E:TEMPFILE.DAT] RETURN
```

would back up all files from the default drive that have a .DAT extension—except the file named TEMPFILE.DAT, which would be omitted.

L—List Directory

The L option causes BACKUP to give the internal directory of files that are contained within a specified backup file. The directory information would list the volume number at which each individual file starts and ends, the user area from which each individual file came, and the amount of disk space occupied by each file.

The L option is used for commands in the following form:

```
A>BACKUP {d}:{destfile} [L] RETURN
```

Where BACKUP is the command line function, stored in the file BACKUP.COM on the default or logged partition/drive;

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where {d} is the optional name of the drive that has received the copies being transferred. This specification is necessary only if the destination drive is not also the default drive;

where {destfile} is the primary name of the backup file, which you wish to contain all of the individual files copied in this operation; and

where [L] is the single-letter option that causes the display of backup file directory features.

The L option may be used with both methods of invoking backup. For example, from the CP/M system prompt:

```
A>BACKUP BACK9 [L] RETURN
```

or the same operation from the BACKUP utility prompt:

```
>BACK9 [L] RETURN
```

The L directory listing will appear in the following form:

Filename	User	Start Volume	End Volume	Size in Kilobytes
INDIVID1.DAT	0	1	1	3264
INDIVID2.DAT	0	1	1	19582
INDIVID1.DOC	15	2	3	7236
INDIVID2.DOC	15	3	3	22230

4 file(s) on 3 volume(s)

Q—Query Each

When the Q option is used, you are queried about each file before any of the files are backed up, by a prompt in the following form:

```
Backup {x}:{sorcfil} from user {n} (Y/N) ?
```

Where {x} is the drive containing a source file that you specified for this operation;

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where {srcfile} is a source file that you specified for this operation; and

where {n} is the number (0-15) of the user area from which the source file could be backed up.

A prompt in this form is displayed for each file BACKUP encounters that matches the source specifications you entered.

For example, if the current user area is 0 and three .DOC files exist on source disk B in user area 0, and if the command to BACKUP was:

```
A>BACKUP C:BACK1=B:*.DOC [Q] RETURN
```

then BACKUP would ask:

```
Backup B:FILE1.DOC from user 0 (Y/N) ?
```

After you respond it would ask,

```
Backup B:FILE2.DOC from user 0 (Y/N) ?
```

and finally,

```
Backup B:FILE3.DOC from user 0 (Y/N) ?
```

In response to such a prompt, press **Y** or **y** to cause the file to be backed up. Press **N** or **n** to prevent the file from being backed up.

S—System Files

The S option allows BACKUP to back up files that have been set in the directory (by the STAT utility) as system files. System files will not be backed up merely because of this option, but only if this option is used in a command line where system files are specified as sources.

When the S option is not included in the command line, system files are ignored during the BACKUP operation—even if these files are specified in the command line.

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U—User Number

The U option causes BACKUP to back up only the individual files within the specified user area(s). If you do not include a U option in the BACKUP command, then BACKUP will back up only the individual files from the current user area.

NOTE: CP/M enables you to divide each of your disks and partitions into 16 separate user access areas, numbered 0-15. When you boot up a partition or disk, you are working within user area 0 until you enter a USER command. See the "USER" text in the "User's Guide" of your CP/M-86 manual for more information on user areas.

Specify the user option in the following form:

[U:n1,n2,...]

Where U is the option letter;

where : (colon) must separate the option letter from the user number(s);
and

where n1 stands for the number (0-15) of one of the user areas from which BACKUP will copy individual files. If you specify more than one user area number, separate each with a comma.

You can specify as many as 16 user areas with a single U option. You can specify any user area(s) regardless of the user area currently being used.

V—Verify

The V option causes BACKUP to verify all files copied. With V, BACKUP reads each source file after it is copied to make sure that the source and destination copies are identical.

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During the operation, BACKUP displays messages in the following form:

```
E:FILENAM1.EXT from user 12
Verifying E:FILENAM1.EXT
E:FILENAM2.EXT from user 12
Verifying E:FILENAM2.EXT
E:FILENAM3.EXT from user 12
Verifying E:FILENAM3.EXT
.
.
.
E:FILENAMn.EXT from user 12
Verifying E:FILENAMn.EXT
```

Runtime Prompting

After you invoke BACKUP and enter a command to perform some operations, you will be prompted to enter the date and/or to insert various disks.

Date Prompt

Whenever you enter a BACKUP command in which both source and destination are specified and the D option is not specified, BACKUP will prompt you to enter today's date, so that the backup file directory can show the date on which the operation took place. (If you do not specify both destination and source in the command line, or if you do specify the D option, then no date prompt will appear.)

This date prompt will appear after you have entered a command line:

Enter today's date:

You should respond to this prompt with an entry in the following form:

Enter today's date: {mm}-{dd}-{yy} RETURN

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Where {mm} is a one- or two-digit entry for the month, within the range 1-12;

where {dd} is a one- or two-digit entry for the day of the month, within the range 1-31;

where {yy} is a one- to four-digit entry for the year, within the range 0-9999; and

where either - (hyphens) or / (slashes) can be used to separate month from day and day from year, although - (hyphen) will always appear in the dates of the display.

NOTE: If you enter BACKUP commands through the utility prompt method, you will be prompted to enter the date only once during the BACKUP session. The date that you enter at the prompt (displayed after the first command you enter with both source and destination) will be applied to any backup file copied until you exit from BACKUP.

After you have specified a date, BACKUP should begin to copy individual files, displaying the drive name, file name, and user area number of each individual file as it is copied, in the following form:

```
E:FILENAM1.EXT from user 9  
E:FILENAM2.EXT from user 9  
E:FILENAM3.EXT from user 9
```

Disk Insertion Prompt

If a BACKUP operation requires more than one backup disk to accommodate all of the source files, then you will be prompted to insert formatted disks each time a previously inserted disk becomes full. BACKUP will keep track of the number and sequence of the disks you insert, and designate a "Volume" number for each disk in the set.

NOTE: If you are performing a BACKUP operation from a floppy disk to a Winchester disk partition, the Backup Disk Set can consist of only one partition. You will not be able to back up files to any other partition during this operation—even if another assigned formatted CP/M partition

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exists on the Winchester disk. Therefore, if you wish to back up files to a Winchester disk partition, you should make certain that this partition has enough free space to accommodate all of the backup files. Use the ASSIGN and STAT utilities beforehand to determine file size and free partition space.

When BACKUP has filled a backup disk to capacity, it will display a message in the following form:

Insert another disk in drive x for backup,
and hit RETURN when ready,
or hit any other key to abort.

Where drive x identifies the destination drive you specified in the BACKUP command.

If you are ready to continue the operation, insert a disk that has been formatted by the CP/M-86 FORMAT utility. This disk may also contain other files. Then you should close the drive latch and press the **RETURN** key.

If you do not wish to continue the operation, or if your destination medium is a Winchester disk partition, then press some key other than the **RETURN** key. The BACKUP operation will end, and a prompt will appear. (The BACKUP utility prompt will appear if you invoked BACKUP by the utility prompt method. The CP/M system prompt will appear if you invoked BACKUP by the system prompt method.)

Master Disk Insertion Prompt

The first disk in the backup set is known as "volume one," or the "master volume" of the backup file. This disk contains a file with the primary name that was specified in the command line as the destination, and with the extension "000."

As the specified source files for a BACKUP operation are being backed up, BACKUP accumulates a list of statistics, such as the names of the individual files it backs up and the number of volumes required.

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After all of the files have been copied, BACKUP will try to record this list in the directory at the beginning of the master disk. If the operation required more than one backup volume, then BACKUP will prompt you to reinsert the master disk of the backup set.

The prompt that requests reinsertion of the master disk volume appears in the following form;

Insert backup master volume 1, {destfile}.000, in drive {x},
and hit RETURN when ready.

Where {destfile} is the primary file name you specified for the destination file; and

where {x} identifies the destination drive you specified in the BACKUP command.

In response to a prompt in this form, you should insert the master volume disk (the disk that was first inserted in the destination drive during this BACKUP operation). Then you should close the drive latch and press the RETURN key.

BACKUP will then try to record statistics about the BACKUP operation in the master backup file directory.

If BACKUP finds the master backup file on the disk you just inserted, it will record the statistics in the directory, and a prompt (utility prompt or system prompt) will appear to signal the end of this BACKUP operation.

If BACKUP cannot find the master backup file on the disk you just inserted, it will display a message in the following form:

Cannot open master backup file, {destfile}.000,
insert another disk in drive {x},
and hit RETURN when ready,
or hit any other key to abort.

Where {destfile} is the primary file name you specified for the destination file (the copy of this file with the "000" extension is called the master backup file); and

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where {x} identifies the destination drive you specified in the BACKUP command.

If you wish to complete the operation and can obtain the disk that contains the master backup file (which has the primary name displayed as {destfile} and the "000" extension), then insert this disk in the specified drive, close the drive latch, and press **RETURN**.

If you do not wish to continue the operation or cannot obtain the disk that contains the master backup file, then press any key other than **RETURN**. The BACKUP operation will end and a prompt (utility or system prompt) will appear.

Preparing BACKUP Routines

BACKUP can be very useful if you create backups on a regular basis. BACKUP was designed specially so that you would be able to store the BACKUP command lines that you enter on a regular basis, so that they can be entered automatically, with far less typing.

To store BACKUP commands for automatic execution, you will need a text editor or word processor and the SUBMIT utility.

The text editor or word processor will enable you to prefabricate and store commonly entered BACKUP command lines in a disk file. The SUBMIT utility will enable you to type a short, simple command line that causes automatic execution of all the stored BACKUP commands.

This text explains a few BACKUP routines geared toward users of some popular application software products available for your computer system. The text on each routine shows you how to prepare the routine by explaining the following essential facts:

- The type of user who would probably benefit from using the routine.
- The names of the drives in which you should store particular files during the routine.
- The form of the file you should create (with your text editor or word processor) to store commonly entered BACKUP command lines.

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- The form of the SUBMIT command you should type each time you wish to use the routine.

NOTE: To successfully prepare a BACKUP routine, you should understand the operation of the SUBMIT utility. For information on SUBMIT, refer to the "SUBMIT" text in the "User's Guide" of your CP/M-86 manual.

General Purpose Winchester Partition BACKUP Routine

This routine can be helpful for anyone who wants to back up an entire partition regularly. Steps 1 through 3 can be considered preparation steps that you need to perform only once. Steps 4 through 6 should be performed every time you conduct the routine.

1. Using a text editor or word processor, open a text file under the name **GNBACKUP.SUB**.
2. Into this file, enter the following command line:

`BACKUP $1:GNBACK=$2:*. * [D:$3-$4-$5;V] RETURN`
3. Close the text file GNBACKUP.SUB.
4. Use the PIP utility to copy the text file GNBACKUP.SUB and the utility file SUBMIT.COM to drive A, if they are not there already.
5. When you are ready to perform the BACKUP routine, type A: and press **RETURN** to make drive A the default drive.
6. Type a command in the following form:

```
A>SUBMIT GNBACKUP {floppy} {partition} {mm} {dd} {yy} RETURN
```

Where {floppy} is the drive letter of the floppy disk drive to which you wish to back up your files;

where {partition} is the drive letter of the Winchester disk partition from which you wish to back up your files;

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where {mm} is a one- or two-digit entry for the current month, within the range 1-12;

where {dd} is a one- or two-digit entry for today's date, within the range 1-31; and

where {yy} is a one- to four-digit entry for the current year, within the range 0-9999.

For example, if today is February 20, 1984, and you wish to back up files from the drive A partition to the drive C floppy disk, then you should type the following command:

```
A>SUBMIT GNBACUP C A 2 20 84 RETURN
```

BACKUP will back up all files from the partition into a backup file with the primary name "GENBACK."

SuperCalc™ BACKUP Routine

This routine can be helpful to users of the SuperCalc spread sheet program who wish to regularly back up all SuperCalc data files from a Winchester disk partition. Steps 1 through 3 can be considered preparation steps that you need to perform only once. Steps 4 through 6 should be performed every time you conduct the routine.

1. Using a text editor or word processor, open a text file under the name **SCBACKUP.SUB**.
2. Into this file, enter the following command line:


```
BACKUP $1:SCBACK=$2:*.CAL [D:$3-$4-$5;V] RETURN
```
3. Close the text file SCBACKUP.SUB.
4. Use the PIP utility to copy the text file SCBACKUP.SUB and the utility file SUBMIT.COM to drive A, if they are not there already.

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5. When you are ready to perform the BACKUP routine, type A: **RETURN** to make drive A the default drive.
6. Type a command in the following form:

A>SUBMIT SCBACKUP {floppy} {partition} {mm} {dd} {yy} *RETURN*

Where {floppy} is the drive letter of the floppy disk drive to which you wish to back up your files;

where {partition} is the drive letter of the Winchester disk partition from which you wish to back up your files;

where {mm} is a one- or two-digit entry for the current month, within the range 1-12;

where {dd} is a one- or two-digit entry for today's date, within the range 1-31; and

where {yy} is a one- to four-digit entry for the current year, within the range 0-9999.

For example, if today is February 20, 1984, and you wish to back up files from the drive A partition to the drive C floppy disk, then you should type the following command:

A>SUBMIT SCBACKUP C A 2 20 84 *RETURN*

BACKUP will back up all SuperCalc data files from the partition into a backup file with the primary name "SCBACK."

WordStar™ BACKUP Routine

This routine can be helpful to users of the WordStar word processor who wish to regularly back up all WordStar text files that have the same file name extension. Steps 1 through 3 can be considered preparation steps that you need to perform only once. Steps 4 through 6 should be performed every time you conduct the routine.

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1. Using WordStar's non-document editing mode, open a text file under the name **WSBACKUP.SUB**.
2. Into this file, enter the following command line:


```
BACKUP $1:WSBACK=$2:*. $3 [D:$4-$5-$6;V] RETURN
```
3. Save the text file **WSBACKUP.SUB**.
4. Use the PIP utility to copy the text file **WSBACKUP.SUB** and the utility file **SUBMIT.COM** to drive A, if they are not there already.
5. When you are ready to perform the **BACKUP** routine, type A: **RE-TURN** to make drive A the default drive.
6. Type a command in the following form:

```
A>SUBMIT WSBACKUP {floppy} {partition} {ext} {mm} {dd} {yy} RETURN
```

Where {floppy} is the drive letter of the floppy disk drive to which you wish to back up your files;

where {partition} is the drive letter of the Winchester disk partition from which you wish to back up your files;

where {ext} is the one- to three-letter file name extension of the text files you wish to back up;

where {mm} is a one- or two-digit entry for the current month, within the range 1-12;

where {dd} is a one- or two-digit entry for today's date, within the range 1-31; and

where {yy} is a one- to four-digit entry for the current year, within the range 0-9999.

For example, if today is February 20, 1984, and you wish to back up files with the "DOC" extension from the drive A partition to the drive C floppy disk, then you should type the following command:

```
A>SUBMIT WSBACKUP C A DOC 2 20 84 RETURN
```

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BACKUP

BACKUP will back up all WordStar text files with the specified file name extension from the partition into a backup file with the primary name "WSBACK."

Structure of BACKUP Files

The BACKUP utility backs up several primary files into a single backup file. This backup file contains all of the files that were copied, in the order they were specified. At the beginning of the backup file is a directory of the copied files. The BACKUP utility maintains this directory to show the names of the files within the backup file, so that the RESTORE utility, when used, will be able to copy the files to other media.

At the beginning of the backup file directory is an entry for the backup file itself. This backup file directory entry is a sequence of bytes that are stored in the following form:

<u>Field Function</u>	<u>Field Size (bytes)</u>
ID	1
File Control Block (FCB)	32
R	4
quantity of copied files	2
date of backup	2
R	7
release number	1
version number	1
R	<u>14</u>
	64 bytes

Where *ID* is a byte that is set to one to distinguish this master backup directory entry from normal file directory entries;

where *File Control Block (FCB)* is a set of bytes that describes the drive name, primary file name, file name extension, and other characteristics used by CP/M to store files;

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where *R* stands for reserved bytes that are not used for any particular purpose in this version of the software;

where *quantity of copied files* is the number of individual files stored within the backup file;

where *date of backup* is the date that the user entered in response to a prompt during the BACKUP operation; and

where *release number* and *version number* are included to insure that this software will be used only with compatible releases and versions of BACKUP and RESTORE.

NOTE: The file name extension in the "File Control Block (FCB)" of the backup file directory entry is the file name extension of the last volume of the backup disk set—and not necessarily the extension of the volume that contains the directory. Thus you can determine how many volumes were used to accommodate all of the backed up files by looking at the directory in the first volume. (The first volume is the volume given the extension "000" during the BACKUP operation.)

Immediately following the backup file entry in the backup file directory are several sequences of bytes, each describing attributes of one of the individual files that was copied into the backup file during the BACKUP operation. The bytes of the individual file directory entry are stored in the following form:

<u>Field Function</u>	<u>Field Size (bytes)</u>
ID	1
File Control Block (FCB)	32
R	4
start volume	1
end volume	1
start position	2
end position	2
file length	2
U	1
R	18
	64 bytes

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Where *ID* indicates the location of this individual file entry among the other individual file entries in the directory. If the value of this byte is 2, then the entry describes an individual file within the backup file. If the value of this byte is FF, then the entry is a "dummy" entry that merely signals the end of the backup file and does not describe an individual file;

where *File Control Block (FCB)* is a set of bytes that describe the drive name, primary file name, file name extension, and other characteristics used by CP/M to store files;

where *R* stands for reserved bytes that are not used for any particular purpose in this version of the software;

where *start volume* indicates the number of the first backup file volume used to accommodate this individual file;

where *end volume* indicates the number of the last backup file volume used to accommodate this individual file;

where *start position* is the number of 128-byte records between the beginning of the backup file volume and the beginning of this individual file;

where *end position* is the number of 128-byte records between the beginning of the backup file volume and the record following the end of this individual file;

where *file length* is the length of this individual file, as measured in 128-byte records; and

where *U* is the number of the user area from which the individual file came.

The number of individual source files that can be backed up in a single BACKUP operation is limited by the amount of space on the first disk/partition used to receive the backup volumes. This disk/partition must have enough free space to accommodate the entire backup file directory.

NOTE: If any of the source files you specify are random files (as opposed to sequential files), these files might become larger when restored with the RESTORE utility.

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BACKUP Error messages

Verify error, try BACKUP again (Y/N)?

EXPLANATION: BACKUP has detected that the copy of a backed up file on destination medium is different from the original copy of the file on the source medium. This message usually indicates a surface imperfection on the destination medium.

Press **Y** if you wish to have BACKUP try to recopy and verify the same individual file, overwriting the bad copy of this file. Then BACKUP will resume displaying the names of the individual files as they are copied and verified, beginning with the file in which the verification error occurred.

Press **N** if you wish BACKUP to skip the file that it just failed to verify, and try to copy and verify the next of the specified source files.

Backup filename can not be ambiguous.

EXPLANATION: You specified * or ? wild card characters in the destination file name for the BACKUP operation. Repeat the command specifying the destination with an explicit file name.

Can not open master backup file (filename).000,
not enough space on the disk.

EXPLANATION: The disk/partition specified as the destination medium for the backup file (filename) did not have enough free disk space to accommodate the entire backup file directory. Repeat the BACKUP operation specifying a larger partition for the destination (if you are backing up files to the Winchester disk) or insert a formatted floppy disk with more free space (if you are backing up files to a floppy disk drive).

UTILITIES

BACKUP

Extension on backup file specified.
Extension 000 will be assumed.

EXPLANATION: This occurs whenever you try to assign a backup file an extension by specifying a full file name for a destination file. If this occurs, BACKUP ignores the extension you specified and used its standard, sequentially numbered extensions. Program operation will not be disturbed.

Can not find master backup file (filename).000.

EXPLANATION: This message occurs when the /L option is requested for a file from a disk where the master backup {filename}.000, is not present.

File {filename}.{ext} is not found.

EXPLANATION: This message occurs whenever a file is specified for BACKUP or RESTORE and that file is not on the disk.

Insert another disk in drive {x} for backup
and hit RETURN when ready,
or hit any other key to abort.

EXPLANATION: The disk just used to receive some of the copied files is now full. Remove this disk from the drive, label it, insert another formatted disk into the destination drive, close the drive latch, and press the **RETURN** key.

Invalid backup file.

EXPLANATION: This message occurs if the backup file specified in a command does not contain valid information. This may occur if the file specified was not a backup file, but had a "000" extension, or if the data in a backup file had degraded (possibly due to a bad sector or inadvertent exposure of the medium to an electromagnetic field).

UTILITIES

BACKUP

Invalid date in option

EXPLANATION: This message occurs if the date given with the D option was not entered in the proper form. If any of the numbers in the data are out of range, if any numbers are separated by invalid characters, or if the D option letter is omitted, then this message will appear.

Invalid date.

EXPLANATION: This message occurs if the date entered in response to the date prompt does not conform to the proper form for entering dates. If any of the numbers in the date are out of range, or if any numbers are separated by invalid characters, then this message will appear.

Invalid drive designation.

EXPLANATION: This message occurs when a drive name is used that is not in the range of supported drive names (A through F).

Invalid exception file specifications.

EXPLANATION: This message will occur if the exception file specified has a syntax error in the specification.

Invalid filename.

EXPLANATION: This message appears when a file name is specified that does not conform to CP/M file naming conventions.

Invalid selection file specifications.

EXPLANATION: This message is generally caused by a typographical error in the command line. The message results when parameters in the command line appear garbled or incorrectly punctuated.

UTILITIES

BACKUP

Invalid option [x] specified.

EXPLANATION: This message occurs if BACKUP is unable to recognize the option [x] that was specified in the command.

Not enough parameters specified.

EXPLANATION: This message results when the BACKUP command is not complete enough to carry out the intended operation.

Can not open master backup file {filename}.000,
insert another disk in drive x
and hit RETURN when ready,
or hit any other key to abort.

EXPLANATION: This message occurs if the disk that has been inserted is not volume 1. Insert the correct disk.

Can not open backup file {filename}.{nnn},
insert another disk in drive x
and hit RETURN when ready,
or hit any other key to abort.

EXPLANATION: This message occurs when you are asked to insert volume nnn + 1 (which would contain {filename}.{nnn}) and the wrong disk is inserted. Insert the correct disk.

Invalid user option.

EXPLANATION: This message occurs if the user number specified with the U option is not in the range 0-15 or if a user number was specified with improper syntax.

UTILITIES

BACKUP

Invalid version of BACKUP for {filename.000}.

EXPLANATION: This message occurs if you have used different versions of the BACKUP, for instance in a command that included the [L] option. When producing a directory of a backup file, use the same version of BACKUP as you used to create the backup file.

No file selected.

EXPLANATION: This message occurs if none of the source files you specified in the BACKUP command exist on the default or specified source media.

UTILITIES

CONFIGUR

The Utility that Customizes CP/M for Your Hardware and/or Preferences

The CONFIGUR utility helps you to change the CP/M Operating System so that it will accommodate a particular printer or modem. CONFIGUR also enables you to set the system to automatically invoke commands upon cold boots and/or warm boots and to assign physical devices to logical devices. After you have specified these changes to the system, CONFIGUR enables you to apply them to the system in memory and/or the system on disk, or to cancel them completely.

CONFIGUR is usually run during the first session of CP/M use in a particular hardware environment. But it should also be run whenever a hardware component is added or changed, or whenever you wish to change an automatic command line.

You do *not* need to use CONFIGUR if you do not have a printer or modem, or if you have one of the following:

- A serial printer (such as the Z-125 or the H-125) that runs at 4800 baud, accepts 8 bits per character, uses no parity bit, handshakes with RTS pin number 4, is ready when handshaking signal is High, and uses no protocol.
- A modem (such as the WH-13, the Lexicon WH-23, the UDS WH-33, or the Hayes WH-43) that runs at 300 baud, accepts 8 bits per character, uses no parity bit, and uses no handshaking.

These hardware settings match the default settings of the CP/M-86 system when it is shipped.

Since CONFIGUR adjusts the system for hardware characteristics, you must sometimes answer prompts that ask about these characteristics. Always consult your hardware manuals and check the settings of your hardware devices when answering these prompts.

NOTE: Changes specified through the CONFIGUR utility can only be recorded on a disk if the disk is write-enabled. If you are performing a CONFIGUR operation with a write-protected disk, you can only apply changes to the system in memory.

UTILITIES

CONFIGUR

Invoking CONFIGUR

You can invoke CONFIGUR by responding to the system prompt with a command line in the following form:

```
A>CONFIGUR RETURN
```

This entry causes the display of CONFIGUR's identification message, copyright notice, version number, and "MAIN MENU."

CONFIGUR Main Menu

CONFIGUR is a menu-driven utility. It first displays a main menu, which looks like this:

```
CP/M-86 System Configuration Utility rel. X.XX  
Copyright (c) 1983 by Zenith Data Systems
```

```
*** MAIN MENU ***
```

```
P - Printer Configuration  
M - Modem Configuration  
C - Command Configuration  
I - I/O map Configuration  
? - Brief Help message
```

```
X - Exit
```

```
Selection [P,M,C,I,X or ?] :
```

This menu enables you to access any of four sub-menus so that you can adjust the CP/M Operating System to accommodate your printer or modem. From this menu you may also specify an automatic command line preference and specify the I/O configuration for different physical devices. In addition, you can obtain screen displays of helpful comments about the menu and its use. This menu also enables you to exit the CONFIGUR utility, and thus gain access to the operating system.

To enter a particular sub-menu or exit selection, type the character listed to the left of that selection.

NOTE: By entering a ? at this menu, you will cause a screen display of helpful comments about this menu and its use.

UTILITIES

CONFIGUR

Printer Configuration

In order to adjust the system to accommodate your printer, you must select "Printer Configuration" at the main menu and specify your printer either by its name or by its characteristics.

When you enter **P** at the main menu, CONFIGUR displays the following sub-menu:

*** Printer Configuration ***

- 1- MX-80 or other PARALLEL Centronics-interface printer
- 2- H/Z-25
- 3- H-14 or TI-810(WH-24)
- 4- Dec LA-34 or LA-36
- 5- Diablo 620
- 6- Diablo 630, 1610, 1620, 1630 or 1640 (WH-44)
- 7- MX-80 Serial
- 8- Votrax Type 'n Talk
- 9- User-defined SERIAL Printer

Choose the number that corresponds to your printer :

- If your printer is listed by name in this menu, and you have not changed the switch settings since it was shipped, then see "Specifying Printer Name."
- If you have a printer that is not listed by name on this menu or a listed printer on which the switch settings have been changed since shipping, then see "Specifying Printer Characteristics."

Specifying Printer Name

If your printer is listed by name on the "Printer Configuration" menu, and you have not changed the switch settings since it was shipped, then type the number listed to the left of the printer name.

This entry will adjust CP/M to accommodate the characteristics that usually apply to your type of printer when it is shipped.

UTILITIES

CONFIGUR

CONFIGUR then displays a message describing the characteristics of the printer you selected. The printer descriptions for each menu-listed printer are shown in the following list.

NOTE: If you have a printer that is not listed by name on this menu, or a listed printer on which the switch settings have been changed since shipping, then type **9** and press **RETURN**, and see "Specifying Printer Characteristics."

Each printer you select in response to the "Printer Configuration" menu has different characteristics, which are described in the message CONFIGUR displays after your selection.

MX-80 or Centronics

You have selected a MX-80 Parallel, and Centronics

Assure Centronics style parallel operation

Press RETURN to access Main Menu:

H/Z-25

You have selected a H/Z-25

Standard settings:

4800 baud

Handshake on RTS

Printer ready on high

Press RETURN to access Main Menu:

UTILITIES

CONFIGUR

H-14 or TI-810

You have selected a H-14, TI-810 (WH-24)

Standard settings:

4800 baud

Handshake on RTS

Printer ready on low

Press RETURN to access Main Menu:

DEC LA-34 or LA-36

You have selected a DEC LA-34 or a LA-36

Standard settings:

300 baud

Press RETURN to access Main Menu:

Diablo 620

You have selected a Diablo 620

Standard settings:

300 baud

ETX/ACK protocol

Press RETURN to access Main Menu:

Diablo 630 or 1640

You have selected a Diablo 630, 1610, 1620, 1630 or 1640 (WH-44)

Standard settings:

1200 baud

ETX/ACK protocol

Press RETURN to access Main Menu:

UTILITIES

CONFIGUR

MX-80 Serial

You have selected a MX-80 with serial interface

Standard settings:

4800 baud

Handshake on DTR

Printer ready on high

Press RETURN to access Main Menu:

Votrax Type 'N Talk

You have selected a Votrax Type 'n Talk

Standard settings:

4800 baud

Handshake on RTS

Printer ready on high

Press RETURN to access Main Menu:

After you view the message that lists your printer's characteristics, press **RETURN**. The "MAIN MENU" will be redisplayed.

- If the settings of your printer match those listed in the message for your printer, then enter the letter for another selection.
- If you specified your printer by name at the "Printer Configuration" menu, but want this printer set with characteristics that differ from those listed for your printer by CONFIGUR, type **P** again at the "MAIN MENU." Then type **9** at the "Printer Configuration" menu and see "Specifying Printer Characteristics."

NOTE: Printers selected by name at the "Printer Configuration" menu have their appropriate physical device assigned automatically to the LST: logical device.

UTILITIES

CONFIGUR

Specifying Printer Characteristics

To adjust the system for a printer that is not listed by name on this menu, or a listed printer on which the switch settings have been changed since shipping, type 9 at the "Printer Configuration" menu.

CONFIGUR will then prompt you to specify characteristics of your printer such as: baud rate, bits per character, parity, handshaking pin, handshake polarity, and protocol.

NOTE: If you respond to the bits per character, parity, handshaking pin, handshake polarity or protocol by pressing RETURN without first typing one of the values listed in the prompt, the prompt will be redisplayed.

Printer Baud Rate

When you enter 9 at the "Printer Configuration" menu, CONFIGUR will first display the following message:

User Defined Printer

Baud rate selection
(Space=next possibility,
BACK SPACE=last possibility,
RETURN=select this one)
Baud Rate : 45.5

Explanation

Baud rate is the speed at which data are transmitted to and from your printer, roughly corresponding to the number of bits per second transmitted. Since CP/M coordinates the transmission of data to and from your printer, CP/M must know how fast your printer is set to send and receive data.

UTILITIES

CONFIGUR

Specification

To the right of Baud Rate : in this prompt, you will see a number that corresponds to one of the 16 baud rates possible on the Z-100 computer (45.5, 50, 75, 110, 134.5, 150, 300, 600, 1200, 1800, 2000, 2400, 4800, 9600, 19200, 38400).

Each baud rate value is stored in sequence by CONFIGUR, although only one value is visible at a time. You can view a different value by pressing the **SPACE BAR** for a greater value, or by pressing the **BACK SPACE** key for a lesser value.

When the correct baud rate value is displayed in the Baud Rate : prompt, press **RETURN** to specify this value. CONFIGUR will get ready to set CP/M to accommodate this baud rate value for printer data transmission.

Bits Per Character for Printer

After you have specified a baud rate, CONFIGUR will display the following prompt:

Bits per character [5,6,7 or 8] :

Explanation

Bits per character is the number of significant data bits your printer expects to receive in order to decipher one character (byte) from the stream of bits that are transmitted. Start bits, stop bits, and parity bits are not included in this number. (Most printers accept 7 or 8 bits per character.)

Specification

To specify the number of bits per character your printer accepts, type **5, 6, 7, or 8** at the Bits per character prompt. CONFIGUR will prepare CP/M to transmit this many bits within every character of data it sends.

UTILITIES

CONFIGUR

Printer Parity

After you have specified bits per character, CONFIGUR will display the following prompt:

Parity [O(dd),E(ven),N(one)] :

Explanation

Parity is a method by which data are checked to make sure they have not changed during transmission.

When odd parity is used, a parity bit is sent along with each character that is sent to the printer. Before transmission, this bit is set to either one or zero to ensure that the sum of all of the transmitted bits is an odd number. If the printer receives a byte of data bits and a parity bit that do not all add up to an odd number, then an error must have occurred during transmission.

Even parity works the same way, except that the parity bit is set to either one or zero to ensure that the sum of the transmitted bits is an even number.

When no parity is used, no parity bit accompanies each transmitted character.

Specification

To specify the kind of parity (if any) that is used to check errors in the data sent to your printer, type **O** for odd parity, **E** for even parity, or **N** for no parity. After you type one of these specifications, CONFIGUR will prepare CP/M so that it transmits parity bits as required by your printer.

UTILITIES

CONFIGUR

Printer Handshake Pin

After you have specified the nature of your printer's parity, CONFIGUR will display the following prompt:

Handshake Pin [N(one), D(tr/pin20), R(ts/pin4)] :

Explanation

The *handshake pin* is the circuit through which the printer and the computer signal each other to determine when data should be transmitted. This circuit is one of many that are bundled together in the RS-232C cable that connects the computer with the printer. The printer uses this cable circuit to signal the computer that the printer is ready to receive more data.

The DTR (Data Terminal Ready) handshake pin is labelled with the number 20 on the receptacle ends of the cable; and the RTS (Request To Send) handshake pin is labelled with the number 4 on the receptacle ends of the cable.

Specification

To specify the particular handshake pin (if any) that is used to signal the printer's readiness to receive data, type **N** for no pin, type **D** for the DTR (number 20) pin, or type **R** for the RTS (number 4) pin. After typing one of these specifications, CONFIGUR will prepare CP/M so that it signals the printer's readiness as required by your printer.

Printer Handshake Polarity

If you specified a handshake pin (by typing D or R at the previous prompt), then a prompt will appear in the following form:

Polarity [H(ready when High),L(ready when Low)] :

NOTE: If you specified no handshake pin (by typing N at the previous prompt), then the "Polarity" prompt will not appear. Instead, the handshake pin prompt will be followed by a protocol prompt.

UTILITIES

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Explanation

Polarity is the voltage level at which the printer signals the computer that the printer is ready to receive more data. This signal can be sent at either a high voltage level or a low voltage level. It travels through the handshake pin that was specified at the previous prompt.

Specification

To specify a polarity, type **H** if the printer signals its readiness with a high voltage signal, or type **L** if the printer signals its readiness with a low voltage signal.

Printer Protocol

After you have answered the handshake pin prompt (and possibly the polarity prompt), CONFIGUR will display the following prompt:

Protocol [X(on/Xoff),E(tx/Ack),N(one)] :

Explanation

Protocol is a method of controlling the transmission of data between your computer and your printer by assigning one device or both devices to transmit specific characters as a signal to the other device.

With XON/XOFF protocol, the printer transmits the DC3 character Control-S (Device Control 3: turns transmitter off) when the printer must momentarily stop receiving data, either because the buffer is full or because the printer is "off line." The printer sends the DC1 character Control-Q (Device Control 1: turns transmitter on) when the printer is ready to receive more data, as when the buffer has empty space and the printer is "on line."

With ETX/ACK protocol, the computer transmits the ETX Control-C character at the end of the transmission of a unit of data (to signify the End of TeXt). When the printer processes the unit of data with the ETX character, the printer transmits the ACK Control-R character back to the computer (to ACKnowledge that the data unit was received).

UTILITIES

CONFIGUR

Specification

To specify the particular protocol characters (if any) that are transmitted to signal the printer's readiness to receive more data, type **X** for XON/XOFF protocol, type **E** for ETX/ACK protocol, or type **N** for no protocol. After typing one of these letters, CONFIGUR will prepare CP/M so that it allows transmission of the proper signal characters, if any.

After you have specified a protocol, CONFIGUR will display:

Press RETURN to access Main Menu:

Press **RETURN** and CONFIGUR will redisplay the "MAIN MENU," at which you can enter another selection.

Modem Specification

In order to adjust the system to accommodate your modem, enter **M** at the "Configur Main Menu." Then CONFIGUR will display one or more prompts that help you to specify either the model number or characteristics of your modem. The first modem prompt looks like this:

*** Modem Configuration ***

Standard Heath/Zenith Modem? (WH-13,WH-23,WH-33,WH-43) [Y/N] :

Your response to this prompt depends on whether your modem is listed in the prompt by its model number. If not, you must specify individual characteristics of your modem.

Specifying Modem Model Number

If the model number of your modem (as shown in the Heath/Zenith catalog) is listed in this prompt, and you have not changed the switch settings since it was shipped, they type **Y**. This entry prepares CONFIGUR to adjust CP/M for the characteristics that usually apply to these modems when they are shipped. After the entry, CONFIGUR will redisplay the "MAIN MENU." Then you can enter the letter for another selection.

UTILITIES

CONFIGUR

Specifying Modem Characteristics

If you have a modem that is not listed in this prompt, or if you have a listed modem on which the switch settings have been changed since shipping, then type **N** at this prompt. CONFIGUR will then enable you to specify characteristics of your modem, such as baud rate, bits per character, parity, and handshaking pin. First CONFIGUR displays a prompt for baud rate selection.

NOTE: If you respond to the bits per character, parity or handshaking pin prompt by pressing **RETURN** without first typing one of the values listed in the prompt, the prompt will be redisplayed.

Modem Baud Rate

When you enter the letter **N** at the "Modem Port Selection" menu, CONFIGUR will first display the following message:

```
Baud rate selection
(Space=next possibility,
BACK SPACE=last possibility
RETURN=select this one)
Baud Rate :    45.5
```

Explanation

Baud rate is the speed with which data are transmitted to and from your modem, roughly corresponding to the number of bits per second transmitted. Since CP/M coordinates the transmission of data to and from your modem, CP/M must know how fast your modem is set to send and receive data.

Specification

This prompt enables you to specify the baud rate of your modem. To the right of the words Baud Rate :, you will see a number that corresponds to one of the 16 baud rates possible on the Z-100 computer (45.5, 50, 75, 110, 134.5, 150, 300, 600, 1200, 1800, 2000, 2400, 4800, 9600, 19200, 38400).

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CONFIGUR displays these values, one at a time, in sequence. You can view a different value by pressing the **SPACE BAR** for a greater value, or by pressing the **BACK SPACE** key for a lesser value.

When the correct baud rate value is displayed in the Baud Rate : prompt, press **RETURN** to specify this value. CONFIGUR will prepare CP/M to accommodate this baud rate value for modem data transmission.

Bits Per Character for Modem

After you have specified a baud rate, CONFIGUR will display the following prompt:

Bits per character [5,6,7 or 8] :

Explanation

Bits per character is the number of significant data bits your modem expects to receive in order to decipher one character (byte) from the stream of bits that are transmitted. Start bits, stop bits, and parity bits (if used) are not included in this number.

Specification

To specify the number of bits per character your modem accepts, type **5, 6, 7, or 8** at the Bits per character prompt. CONFIGUR will prepare CP/M to transmit this many bits within every character of data it sends.

Modem Parity

After you have specified bits per character, CONFIGUR will display the following prompt:

Parity [O(dd),E(ven),N(one)] :

UTILITIES

CONFIGUR

Explanation

Parity is a method by which data are checked to make sure it hasn't changed during transmission.

When odd parity is used, a parity bit is transmitted along with each character that is transmitted to the modem. Before transmission, this bit is set to either one or zero to ensure that the sum of all of the transmitted bits is an odd number. If the modem receives a byte of data bits and a parity bit that do not all add up to an odd number, then an error must have occurred during transmission.

Even parity works the same way, except that the parity bit is set to either one or zero to ensure that the sum of all of the transmitted bits is an even number.

When no parity is used, no parity bit accompanies each transmitted character.

Specification

To specify the kind of parity (if any) that is used to check errors in the data sent to your modem, type **O** for odd parity, **E** for even parity, or **N** for no parity. After typing one of these specifications, CONFIGUR will prepare CP/M so that it transmits parity bits as required by your modem.

Modem handshake Pin

After you have specified the nature of your modem's parity, CONFIGUR will display the following prompt:

```
Handshake Pin [N(one), D(tr/pin20), R(ts/pin4)] :
```

Explanation

The *handshake pin* is the circuit through which the modem and the computer signal each other to determine when data should be transmitted. This circuit is one of many bundled together in the RS-232C cable that connects the computer with the modem. The modem uses this circuit to signal the computer that it is ready to receive more data.

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The DTR (Data Terminal Ready) handshake pin is labelled with the number 20 on the receptacle ends of the cable; and the RTS (Request To Send) handshake pin is labelled with the number 4 on the receptacle ends of the cable.

Specification

To specify the particular handshake pin (if any) that is used to signal the modem's readiness to receive data, type **N** for no pin, type **D** for the DTR (number 20) pin, or type **R** for the RTS (number 4) pin. After typing one of these specifications, CONFIGUR will prepare CP/M to signal the modem's readiness, as required by your modem.

Press **RETURN** then CONFIGUR will redisplay the "MAIN MENU," at which you can enter the letter for another selection.

Automatic Command Specification

In order to adjust the system to accommodate your preference in automatic commands, you must type **C** to select "Command Configuration" at the "MAIN MENU." CONFIGUR will display the following menu:

*** Command Line Configuration ***

C - Cold Boot Command Line =
W - Warm Boot Command Line =
? - Brief Help Message

X - Exit

Selection [C,W, ? or X]:

This menu enables you to specify that a command be automatically invoked upon a cold boot, or that a command be automatically invoked upon a warm boot. You can specify up to two different commands: one for execution on cold boot, and one for execution on warm boot. In addition, this menu enables you to display a screen of helpful comments about this menu and its use, if you enter a ?.

UTILITIES

CONFIGUR

Cold Boot Command Line

To specify a command for automatic cold boot invocation, type **C** at the "Command Line Menu." CONFIGUR will display the prompt:

Cold Boot Command Line :

At this prompt type a valid CP/M command line, just as you would type it at a CP/M system prompt. When you press **RETURN** to end the command line, CONFIGUR will display the command line on the "Command Line Menu" and prepare CP/M to invoke this command immediately after every cold boot.

If the menu already shows a cold boot command line and you wish to remove it, type **C** at the "Command Line Menu" and immediately press **RETURN**.

NOTE: Your Z-100 is capable of performing an automatic cold boot when powered up or reset, if a switch within the Z-100 is set properly. If this automatic booting feature is not switched on, you must power up or reset the computer and then enter a bootstrap command to perform a cold boot. In either case, the cold boot will be immediately followed by invocation of a command specified through CONFIGUR.

Warm Boot Command Line

To specify a command for automatic warm boot invocation, type **W** at the "Command Line Menu." CONFIGUR will display the prompt:

Warm Boot Command Line :

At this prompt, type a valid CP/M command line, just as you would type it at a CP/M system prompt. When you press **RETURN** to end the command line, CONFIGUR will display the command line on the "Command Line Menu" and prepare CP/M to invoke this command immediately after every warm boot.

UTILITIES

CONFIGUR

If the menu already shows a warm boot command line and you wish to remove it, type **W** at the "Command Line Menu" and press **RETURN**.

NOTE: A warm boot can occur when you press **CTRL-C** or when some application programs exit to the operating system. In either case, the warm boot will be immediately followed by invocation of a command specified through CONFIGUR.

Acceptable Commands

Any valid resident command, transient command (utility), or application program is acceptable in the automatic command line. However, any file that the command line refers to must reside on the disk specified in the command line. For example, if the line reads:

C - Cold Boot Command Line = B:SC

Then the file "SC.COM" (part of the SuperCalc application program) must reside on the disk in drive B for the command to work. If any data referenced in the command line cannot be found in the specified drives, then command execution will be aborted and an error message will be displayed.

NOTE: Some transient commands, (for example; stat) and application programs finish their execution by performing a warm boot. Therefore, we recommend that you do not enter a warm boot command line for a program that performs a warm boot after execution, because endless execution of the same program may be the result.

Returning to the Main Menu

To finish your command line menu activities and regain access to the "Configur Main Menu," type **X** at the "Command Line Menu." CONFIGUR will redisplay the "MAIN MENU," which enables you to enter the letter for another selection.

UTILITIES

CONFIGUR

I/O Device Specification

In order to adjust the system to send certain types of data through different physical devices, enter I at the "Configur Main Menu." Then CONFIGUR will display a menu in the following form:

I/O Map Configuration

C - Console Currently: CRT
I - Auxin Currently: UR1
O - Auxout Currently: UP1
L - List Currently: LPT
? - Brief Help Message

X - Exit

Selection [C,I,O,L,? or X] :

(The current assignments of your physical devices may differ from those in this sample menu.)

This menu shows the physical device names that are currently assigned to each logical device category.

NOTE: If you have already chosen a printer (by name or by characteristics) during this CONFIGUR run, then List device will have been automatically assigned to the proper physical device. Therefore, the letter "L" will *not* be listed in the I/O map selection prompt. Furthermore, you will not be able to select the List device during this CONFIGUR run.

Logical/Physical Device Categories

Data can be sent to or from a wide variety of peripheral hardware devices. CP/M groups these devices under the logical device categories "Console," "Auxin," "Auxout," and "List" (as shown on the left side of the menu).

However, these categories provide CP/M with only a general reference to the actual device being used. CP/M is capable of controlling data transfer through many different devices that are included in these categories.

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CONFIGUR

Therefore, a more specific name must be assigned to each logical device category to inform CP/M of the kind of devices it must control. The specific name assigned to each logical device category is the "physical device name." Each physical device name helps CP/M to recognize and control a particular kind of peripheral hardware.

The physical device name currently assigned to each logical device category is listed on the right side of the menu.

Following is the table that is displayed when you select the Brief Help Message in the I/O Map Configuration Menu. It will help you determine which physical device names can be matched with which logical device names.

SELECTION LETTER	LOGICAL DEVICE CATEGORY	PHYSICAL DEVICE NAME	DESCRIPTION AND/OR CATALOG NAME OF THE ACTUAL HARDWARE DEVICE USED
C	Console	TTY:	A printing terminal attached to serial port outlet A on the Z-100 (e.g., Decwriter).
		CRT:	A video display terminal and keyboard.
		BAT:	A batch pseudo-device using RDR: for input and LST: for output.
		UC1:	A modem attached to serial port B on the Z-100.
I	Auxin	TTY:	A printing terminal attached to serial port outlet A on the Z-100 (e.g., Decwriter).
		PTR:	Not implemented.
		UR1:	A modem attached to serial port B on the Z-100.
		UR2:	A video display terminal and keyboard.
O	Auxout	TTY:	A serial printer attached to serial port outlet A on the Z-100.
		PTP:	Not implemented.
		UP1:	A modem attached to serial port B on the Z-100.
		UP2:	A video display terminal and keyboard.
L	List	TTY:	A serial printer attached to serial port outlet A on the Z-100 (e.g., H/Z-25, H-14, TI-810, Diablo, Epson MX-80 serial, Decwriter).
		CRT:	A video display terminal and keyboard.
		LPT:	A parallel printer attached to the parallel port on the Z-100 (e.g., Epson MX-80 parallel).
		UL1:	A modem attached to serial port B on the Z-100.

UTILITIES

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NOTE: By entering a ? at this menu, you will cause a screen display of helpful comments about this menu and its use.

Assigning Physical Device Names

To select a logical device category to be changed, you must first type the letter (**C**, **R**, **P**, or **L**) listed to the left of the category in the menu and press **RETURN**. CONFIGUR will display one of the following prompts:

Console: [T(ty), C(rt), B(at) or 1(UC1)]:

or

Auxin: [T(ty), P(tr), 1(UR1), 2(UR2)] :

or

Auxout: [T(ty), P(tp), 1(UP1), 2(UP2)] :

or

List: [T(ty), C(rt), L(pt), 1(UL1)] :

Each of these prompts shows the logical device category on the left, and all of the physical device names that could be assigned to this category on the right.

To assign a physical device name to a logical device category, type the single character of the name that is displayed outside the parentheses.

CONFIGUR will respond by displaying the name of the specified physical device in the "I/O Map Configuration" menu.

You can access the CONFIGUR MAIN MENU by entering **X** at the "Selection" prompt beneath the "I/O Map Configuration."

NOTE: These logical/physical device assignments can be temporarily changed outside of CONFIGUR by using the STAT utility.

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Assignment Examples

For instance, if you want to change the assignment of physical device name "TTY" to "LPT" in the "List" category, type **L** (for "List") at the menu's selection prompt. Then type **L** (for "LPT") at the "List" category prompt. CONFIGUR will redisplay the "I/O Map Configuration" menu with the "LPT" named as "Currently" the physical device assigned to "List."

As a further example, if you wish to assign the physical device name "UR1" in place of the name "PTR" for the "Reader" category, type **R** (for "Reader") at the menu's selection prompt. Then type **1** (for "UR1") at the "Reader" category prompt. CONFIGUR will redisplay the "I/O Map Configuration" menu with the "UR1" named as "Currently" the physical device assigned to "Reader."

Exiting from CONFIGUR

The "MAIN MENU" enables you to exit from the CONFIGUR utility and eventually to gain access to the CP/M Operating System.

CP/M-86 System Configuration Utility rel. x.xx
Copyright (C) 1983 by Zenith Data Systems

*** MAIN MENU ***

P - Printer Configuration
M - Modem Configuration
C - Command Configuration
I - I/Omap Configuration
? - Brief Help message

X - Exit

Selection [P,M,C,I X or ?]:

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CONFIGUR

The Exit Selection

To begin to exit from CONFIGUR to CP/M, press **X**.

If you have *not* specified any changes to the system during this CONFIGUR activity, CONFIGUR will immediately relinquish control to CP/M, which will display the system prompt.

If you *have* specified any changes to the system during this CONFIGUR activity, CONFIGUR will display the following "Exit" menu:

*** EXIT OPTIONS ***

- T - Make changes temporary (to memory only)
- P - Make changes permanent (to memory and disk)
- Q - Make no changes

- ? - Brief Help Message

Choice [T,P,Q or ?]:

- If you wish to cancel all of the changes that you have specified without having them applied to the system, then press **Q**. The unchanged CP/M Operating System will then display the system prompt.

- If you wish to have CONFIGUR apply all of the changes you have specified only to the CP/M system now in active computer memory, then press **T** (for Temporary) at this prompt. These changes will remain in effect until the computer is reset. If you have specified changes pertaining to printers and/or modems, CONFIGUR will now display a diagram to assist you in connecting your hardware devices. (See "Connecting Your Hardware.") However, if you have specified no printer or modem changes, CONFIGUR will now relinquish control to CP/M, which will display the system prompt.

- If you wish to have CONFIGUR apply all of the changes you have specified both to the CP/M system in active computer memory and the system on the disk, then press **P** (for Permanent) at this prompt.

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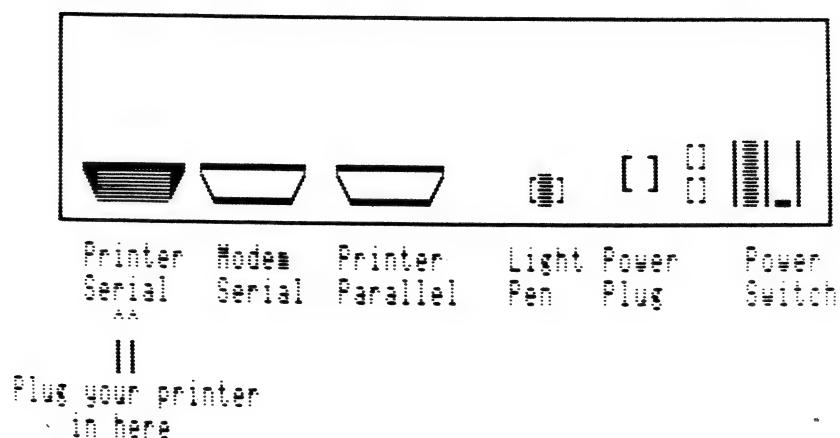
These changes will go in effect as soon as CP/M regains control. These changes will be recorded on the disk in drive A until the next CONFIGUR session conducted with the same disk in drive A. If you specified changes pertaining to printers and/or modems, CONFIGUR will now display a diagram to assist you in connecting your hardware devices. (See "Connecting Your Hardware.") However if you have specified no printer or modem changes, CONFIGUR will now relinquish control to CP/M, which will display a system prompt.

NOTE: If the disk in drive A was write-protected when you invoked CONFIGUR, the "P - Make changes permanent" choice will not appear in the "Exit" menu, and entering the letter P at this menu will have no effect.

Connecting Your Hardware

Before returning control to CP/M, CONFIGUR will display a diagram in the following form:

Z-100 Rear Panel



Press **RETURN** to continue:

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CONFIGUR

This diagram shows the location of the outlet on your Z-100 rear panel, onto which you should attach the cable that leads to your printer and/or modem. Attach the applicable cable(s) to the indicated outlet(s) before trying to use the printer and/or modem.

NOTE: This example diagram shows the message that will appear beneath the diagram if you had specified a serial printer during this CONFIGUR activity. The message appears beneath a different peripheral outlet if you have specified a parallel printer or a modem.

When your hardware devices are all properly attached, you can press **RETURN** to exit to the operating system.

CONFIGUR Error Messages

Incompatible Configur & CPM-86

EXPLANATION: You are running a CONFIGUR utility under a CP/M of a different version. The version number of your CONFIGUR and your CP/M must match. Copy CP/M (using LDCOPY) and CPM.SYS and CONFIGUR (using PIP) from CP/M-86 Distribution Disk I, boot up, and invoke CONFIGUR again.

Bad choice. Choice [1..9]:

EXPLANATION: Your entry at the "Printer selection" menu was not a number between 1 and 9. Enter the number between 1 and 9 that corresponds to your printer.

UTILITIES

FORMAT

The Utility that Prepares Disk or Partition Surface

The FORMAT utility prepares a floppy disk or Winchester partition for the storage of data by establishing storage areas on the disk surface. At the same time, FORMAT erases any data that remain on the disk or partition from prior use, and sometimes inspects the recording surface for imperfections that could impair data storage or transmission. FORMAT also enables you to determine how much data you will be able to store on a floppy disk.

CAUTION: Because FORMAT erases all existing data on a disk or partition, make certain that you only format disks or partitions containing expendable data or no data. You can use the DIR or STAT commands (see the "User's Guide") to check for valuable data files before formatting. However, the DIR and STAT commands do not always display all of the files on a disk or partition.

You can use the FORMAT utility through either of two methods: the Utility Prompt Method or the System Prompt Method.

Utility Prompt Method

With this FORMAT method, you load the FORMAT utility into memory by entering a command at the system prompt. Then you answer a series of FORMAT prompts to define the formatting operation.

Utility Prompt Command Entry

Answer the system prompt with a command in the following form:

A>FORMAT RETURN

UTILITIES

FORMAT

When invoked through the FORMAT prompt method, FORMAT first identifies itself with name, version number, and a caution about its capabilities. It also asks you if you wish to continue the operation, as shown:

```
CP/M-86 Format Version x.xx  
Copyright (c) 1983 by Zenith Data Systems
```

```
This program is used to initialize a disk.  
All information currently on the disk will be destroyed.  
Is that what you want? (Y/N):
```

Respond to this question by entering **Y** if you wish to format a disk or partition. Enter **N** if you do not.

Specifying the Disk or Partition to be Formatted

After you have confirmed your intention to format a disk or partition **FORMAT** asks:

```
Which drive do you wish to use for this operation?:
```

Answer this prompt by entering the letter of the drive containing the disk (or assigned the partition) you wish to format. The drive you specify must be a valid disk drive in your hardware environment.

The drive you specify does not necessarily have to be a physical drive. For instance if you have only one physical 5.25-inch drive slot, then you can specify drive B at this prompt. You will later be prompted to put the appropriate 5.25-inch disk in the drive.

However if you specify a Winchester partition, this partition must have already been assigned a drive name. If the partition you wish to format is not currently assigned to the specified drive name, you must exit from the **FORMAT** utility and use the **ASSIGN** utility to assign this partition to the drive. You can exit from **FORMAT** at the "Which drive" prompt by entering **CTRL-C**.

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FORMAT

Defining the FORMAT Operation

After you specify the drive containing the disk or partition you wish to format, FORMAT will display another prompt. The kind of prompt FORMAT displays depends upon whether you are trying to format a 5.25-inch floppy disk, an 8-inch floppy disk, or a Winchester partition.

Formatting a 5.25-Inch Disk

If you specified a drive that contains a 5.25-inch disk, the FORMAT utility enables you to specify the number of sides you want formatted by displaying the following prompt:

Number of Sides? (1=single, 2=double):

Entering the number **1** at this prompt will give the formatted disk a file capacity of 148 kilobytes. Entering the number **2** will give the formatted disk a file capacity of 304 kilobytes.

NOTE: All 5.25-inch disks formatted with this CP/M release are automatically formatted at double density. Therefore, the FORMAT utility will not prompt you to specify the density (level of data concentration) at which you want a 5.25-inch disk formatted.

After you respond to the Number of Sides? prompt, FORMAT will display a prompt in the following form to enable you to begin or cancel the FORMAT operation:

Put the disk you wish to be formatted in drive x.
Press RETURN to begin, anything else to abort.

(The character x stands for the letter of the disk drive you specified.) Pressing **RETURN** at this prompt will begin the actual formatting operation, while entering any other keyboard character will terminate the FORMAT operation without formatting the disk/partition.

NOTE: It takes at least one minute for FORMAT to format a disk. During this time the light on the specified disk drive will glow.

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Formatting an 8-Inch Disk

If you are formatting an 8-inch disk, the **FORMAT** utility enables you to specify the level of density at which you wish to store data by displaying the following prompt:

Which density? (S=single, D=double):

The *density* of a disk refers to the level of concentration of the data stored on its surface. Higher density levels sometimes decrease data access reliability.

- If the disk in the specified drive is single-sided, then entering the letter **S** (for single density) at this prompt will give the formatted disk a file capacity of 241 kilobytes. Entering the letter **D** (for double density) will give the formatted disk a file capacity of 482 kilobytes.
- If the disk in the specified drive is double-sided, then entering the letter **S** (for single density) at this prompt will give the formatted disk a file capacity of 490 kilobytes. Entering the letter **D** (for double density) will give the formatted disk a file capacity of 980 kilobytes.

NOTE: Some 8-inch disks allow you to format only one side and others allow you to format both sides. These two types of disk are distinguished by the position of a small hole in the disk jacket, near the center spindle hole. The number of sides that can be formatted on a particular 8-inch disk is an unchangeable feature of that particular disk. The **FORMAT** utility automatically detects the position of this hole and prepares to format the disk on the appropriate number of sides.

After you respond to the **Which density?** prompt, **FORMAT** will display a prompt in the following form to enable you to begin or cancel the **FORMAT** operation:

Put the disk you wish to be formatted in drive x.
Press **RETURN** to begin, anything else to abort.

(The character **x** stands for the letter of the disk drive you specified.) Pressing **RETURN** at this prompt will begin the actual formatting operation, while pressing any other keyboard character will terminate the **FORMAT** operation.

UTILITIES

FORMAT

NOTE: It takes at least one minute for FORMAT to format a disk. During this time the light on the specified disk drive will glow.

Formatting a Winchester Disk Partition

If you specified a drive that has been assigned a Winchester partition, FORMAT will display a prompt in the following form to enable you to begin or cancel the FORMAT operation:

Will format partition assigned to drive x:

Press RETURN to begin, anything else to abort.

(The character x stands for the letter of the partition you specified.) Pressing **RETURN** at this prompt will begin the actual formatting operation, while pressing any other keyboard character will allow you to end the FORMAT operation.

The file capacity of the partition you are formatting is determined before you invoke the FORMAT utility, by the PREP utility (which automatically allocates half of the Winchester disk space to a single CP/M partition), or by the PART utility (which enables you to determine the size of your partitions). See text sections on "PREP" and "PART" in the Winchester User's Supplement for more information.

NOTE: As FORMAT formats a partition the light on the Winchester disk drive will glow.

Ending a FORMAT Operation

When FORMAT finishes preparing a disk's surface, or when you press "anything else to abort" FORMAT will display the following prompt:

Do you have more disks to format? (Y/N):

If you wish to format another disk or partition without reinvoking FORMAT, press **Y** at this prompt. FORMAT will again prompt you to specify the drive containing the disk or partition you wish to format.

UTILITIES

FORMAT

If you do not wish to format another disk or partition, press **N**. **FORMAT** will display the system prompt. Then you can enter any CP/M command.

NOTE: You can also end a **FORMAT** operation by entering **CTRL-C** at the Which drive prompt.

System Prompt Method

The System Prompt Method enables you to include all of the specifications necessary for the **FORMAT** operation in a single command line. Enter this command line at the CP/M system prompt.

Command Line Entry

System Prompt Method **FORMAT** commands are entered in the following form:

```
A>FORMAT {drive}:[{option,option}] RETURN
```

Where **FORMAT** is the command line function, stored in the file as **FORMAT.COM** on the logged disk;

where {drive} is the letter of the drive that contains the disk or partition you wish to format (this letter must represent a valid drive in your hardware environment, such as A, B, C, D, E, or F); and

where [{option,option}] represents letters and/or numbers enclosed in square brackets [] and separated by , (commas) to specify how the formatting operation should be conducted.

NOTE: You can specify logical (imaginary) drive names in **FORMAT** commands, as well as physical (visible) drive names. If you specify imaginary drive names, you will be prompted to insert two different disks alternately into a single physical drive slot.

UTILITIES

FORMAT

FORMAT Options

FORMAT command lines entered by the System Prompt Method can include the following options:

- | | |
|----|--|
| SD | 8-inch disk formatted to single density; |
| DD | 8-inch disk formatted to double density; |
| 1S | 5.25-inch disk formatted on only one side; |
| 2S | 5.25-inch disk formatted on both sides; |
| F | Fast formatting, because the routine test of disk surface medium is not performed; |
| N | No prompt displayed between FORMAT command entry and FORMAT execution; |

Options should be enclosed in square brackets and separated by commas when more than one is used. Options are the last item in a System Prompt Method FORMAT command line before you press **RETURN**.

NOTE: All 5.25-inch disks are automatically formatted double density by this version of FORMAT. 8-inch disks are automatically formatted to be single-sided or double-sided, depending on what format has been certified by the manufacturer. (FORMAT detects this certification by checking the position of the small hole in the disk cover next to the center spindle hole.)

System Prompt Method Defaults

When you enter a FORMAT command line with a drive specification, and decline to specify some or all of the possible options, FORMAT will prepare the disk according to the following default criteria:

- 5.25-inch disk formatted to double density (regardless of any options you might specify);
- 8-inch disk formatted to double density (as if you specified the DD option);

UTILITIES

FORMAT

- 5.25-inch disk formatted on both sides (as if you specified the 2S option);
- 8-inch, single-sided disk formatted on one side (regardless of any options you might specify);
- 8-inch, double-sided disk formatted on both sides (regardless of any options you might specify);
- Disk surface will be tested for data retention (as if you had not specified the F option); and
- Prompts will be displayed between FORMAT command entry and FORMAT execution (as if you had not specified the N option). Therefore, whenever you enter a System Prompt Method command without the N option, the following prompt will appear:

CP/M-86 Format Version x.xx
Copyright (c) 1983 by Zenith Data Systems

This program is used to initialize a disk.
All information currently on the disk will be destroyed.
Is that what you want? (Y/N):

- To confirm your intention to run a FORMAT operation, enter a Y at this prompt. Then FORMAT will display a prompt in the following form if you specified a floppy disk:

Put the disk you wish to be formatted in drive x.
Press RETURN to begin, anything else to abort.

or the following prompt if you specified a Winchester partition:

Will format partition assigned to drive x:

Press RETURN to begin, anything else to abort.

To begin execution of the FORMAT operation for a floppy disk, insert the appropriate disk in drive x (where drive x is the drive you specified in the command line) and press **RETURN**. To begin execution of the FORMAT operation for a Winchester partition, simply press **RETURN**.

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FORMAT

To abort the FORMAT utility, enter any keyboard character other than Y or y at the Is that what you want? prompt, or press anything other than RETURN at the Press RETURN to begin, anything else to abort. prompt. In either case, the FORMAT operation will end and CP/M will display the system prompt.

System Prompt Method Examples

A>FORMAT B: [2S] RETURN

FORMAT will prepare the surface of the disk in drive B (a 5.25-inch disk) to double density and on both sides, as specified by options. FORMAT will display prompts before formatting and will test the disk surface while formatting, by default.

A>FORMAT B: RETURN

FORMAT will prepare the surface of the disk in drive B (a double-sided 8-inch disk). Due to manufacturer's certification, this disk will be formatted on both sides. By default, this disk will be formatted to double density. Also by default, FORMAT will display prompts before formatting and test the disk surface while formatting.

A>FORMAT B: [2S,1S] RETURN

If your command line contains contradictory options, FORMAT will acknowledge the last one. Hence, in this case, FORMAT will format the surface of the disk in drive B (a 5.25-inch disk) on only one side, as specified by the last side quantity option. FORMAT will also display prompts before formatting and test the disk surface while formatting, by default.

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FORMAT

A>C:format B:[Sd,f,N] RETURN

The FORMAT utility, in this case, is stored on the disk in drive C. It will prepare the surface of the disk in drive B (a single-sided 8-inch disk) to single density, as specified by the "Sd" option. Since the disk was manufactured for single-sided data storage, only one side will be formatted. The "f" option specifies that this formatting operation will be performed without a disk media test. The "N" option specifies that FORMAT will not prompt you to confirm your intentions before the formatting operation begins.

NOTE: As with any other command entered at a CP/M system prompt, you can edit a FORMAT command line with the **DELETE** key or erase the entire command line by entering **CTRL-X**.

Disk Capacities

The following tables show the amount of file space remaining on various kinds of disks after they are formatted under various kinds of conditions. (The FORMAT utility also prepares areas of the disk for the recording of the CP/M system kernel and the disk file directory, although the space reserved for such software items is not included in these tables.)

The following table shows the file capacities of 5.25-inch, soft-sectored disks formatted in 48-tpi drives:

	Single-sided	Double-sided
Double density	148 kilobytes	304 kilobytes

This table shows the file capacities of single-sided 8-inch disks:

	Single density	Double density
Single-sided	241 kilobytes	482 kilobytes

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This table shows the file capacities of double-sided 8-inch disks:

	Single density	Double density
Double-sided	490 kilobytes	980 kilobytes

The file capacity of a formatted Winchester disk partition is determined before you invoke the FORMAT utility, by the PREP utility (which automatically allocates half of the Winchester disk space to a single CP/M partition), or by the PART utility (which enables you to determine the size of your partitions). See the sections on "PREP" and "PART" in the Winchester User's Supplement for more information.

NOTE: The FORMAT utility supplied with this CP/M version cannot format any disk to extended double density. However, this CP/M version can write to or read from a disk that was formatted at extended double density by the FORMAT utility of some other CP/M versions.

FORMAT Error Messages

Drive (x) not available in current configuration

EXPLANATION: If you entered a drive name that has not been assigned a partition, or does not exist in your hardware, enter a different drive name.

Disk is write protected.

Unable to format this disk.

Do you have any more disks to format? (Y/N):

EXPLANATION: Remove any adhesive tab that might be attached to the write-enable notch on a 5.25-inch disk cover, or cover the write-protect notch on an 8-inch disk. The Do you have any more disks to format? prompt appears with this message only when you enter a Utility Prompt Method command.

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FORMAT

Unable to format this disk. Place a different disk in the drive and press any key to begin...

EXPLANATION: The disk to be formatted is damaged or improperly inserted in the drive. Try again or replace the disk.

Illegal Format Option

EXPLANATION: System Prompt Method command line was entered with illegal values for options.

Illegal Command Syntax

EXPLANATION: System Prompt Method command line was entered with undefined characters in place of options.

Option Not Available

EXPLANATION: A Utility Prompt Method prompt was answered with inappropriate characters. Enter a pertinent option at this prompt.

PARTITION IS SMALLER THAN MINIMUM ALLOWABLE SIZE

EXPLANATION: Winchester disk partitions under CP/M can be as small as 64 kilobytes. Back up any valuable software and/or data stored on other partitions and use the PART utility to create CP/M partitions that are at least 64 kilobytes in size. Then try the FORMAT utility again.

UTILITIES

FORMAT

PARTITION IS LARGER THAN CP/M MAXIMUM SIZE -- ONLY 8 MEG USABLE

EXPLANATION: The partition being formatted has been allocated 8 megabytes (8192 kilobytes) or more Winchester disk space. You will only be able to access the first 8192 kilobytes on the partition. To make the rest of the partition's space accessible, back up any valuable software and/or data stored on other partitions and use the PART utility to make the partition smaller and to allocate the remaining space to another partition. Then try the FORMAT utility again.

Incorrect version of BIOS

EXPLANATION: The CP/M-86 system and FORMAT utility being used are not of the same version. Use a CP/M-86 system and FORMAT utility that were both copied from the same CP/M-86 distribution disk. Then try the FORMAT utility again.

Not enough memory

EXPLANATION: There is not enough free memory in your computer system to run FORMAT. FORMAT is automatically aborted and control returned to the operating system.

UTILITIES

LDCOPY

The Utility that Copies the CP/M-86 Operating System between Disks

Use the LDCOPY utility to create a bootable CP/M-86 disk. You may copy CP/M-86 from the system tracks of any bootable disk/partition if you are transferring the system between like devices (from floppy to floppy or from disk partition to disk partition). If you are transferring the system between unlike devices (from floppy to disk partition or from disk partition to floppy), you may copy CP/M-86 by using the .CMD file(s) named BOOT207 and BOOT217. Both of these copy operations are detailed below.

The CP/M-86 BIOS file, CPM.SYS, must also be present on a bootable disk. LDCOPY has no effect on CPM.SYS. To transfer it you must use the PIP utility with the R option (see PIP in the "User's Guide").

You may execute LDCOPY by either of two methods: the Utility Prompt method or the System Prompt method. With the Utility Prompt method, LDCOPY is first loaded into memory. You then enter additional parameters in response to specific prompts. This method must be used if you intend to transfer the system to more than one disk. With the System Prompt method, LDCOPY is loaded and all necessary parameters are supplied from a single command line. A detailed description of each method follows.

Utility Prompt Method

Place a disk containing LDCOPY.CMD in a disk drive (A is assumed in this example) and enter:

```
A>LDCOPY
```

and press **RETURN**.

When loading is complete you will see this sign-on message:

```
LDCOPY rel x.xx  
Copyright (c) 1983 Zenith Data Systems Corp.
```

Below the sign-on message the "Source:" prompt will appear:

```
Source:
```

The entry for this response depends upon whether you are transferring the system between like devices (floppy to floppy or disk partition to disk partition) or unlike devices (floppy to disk partition or disk partition to

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LDCOPY

floppy). If you are transferring the system between like devices, use *Response 1* for making the entry to the Source: prompt. If you are transferring the system from floppy to disk partition, use *Response 2* for making the entry to the Source: prompt. And if you are transferring the system from disk partition to floppy, use *Response 3* for making the entry to the Source: prompt.

Response 1 – From floppy to floppy or disk partition to disk partition. If you are transferring a system between like devices, enter the letter of the drive/partition where the system you want to copy is currently located. For example:

Source: B

and press **RETURN**.

Response 2 – From floppy to disk partition. If you are transferring the system from a floppy disk to a disk partition, you must use the .CMD file named BOOT217. To use this file, respond to the Source: prompt by entering the letter of the drive/partition on which this file resides and the name of the file, BOOT217.CMD. For example:

Source: B:BOOT217.CMD

and press **RETURN**.

Response 3 – From disk partition to floppy. If you are transferring the system from a disk partition to a floppy (either 5.25 inch or 8 inch), you must use the .CMD file named BOOT207. To use this file, respond to the Source: prompt by entering the letter of the drive/partition on which BOOT207.CMD resides and the file name. For example:

Source: B:BOOT207.CMD

and press **RETURN**.

When you have made the appropriate entry to the Source: prompt, the destination prompt will appear:

Destination:

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LDCOPY

Enter just the letter of the drive where the destination disk will be located. No file name is necessary since the data will be transferred to the system tracks. For example:

Destination:A

and press **RETURN**.

At this point LDCOPY will verify your entries with the message:

Source on B
Destination on A
Press RETURN to continue;
otherwise enter CTRL-C to abort:

If the information is incorrect or you wish to abort the procedure, enter **CTRL-C**. Control will return to the operating system. If you press **RETURN** this prompt will appear:

Press RETURN when source is in drive B:

Switch disks, if necessary, to ensure the source disk is in the correct drive; then press **RETURN**. Ensure the destination disk is in the correct drive when this prompt appears:

Press RETURN when destination is in drive A:

Two pauses are included so LDCOPY can be used with computers that have only one drive. Press **RETURN** to continue. When the transfer process is complete, this message will appear:

LDCOPY successfully completed
Press RETURN when destination is in drive A:
otherwise enter CTRL-C to abort:

If an error message is displayed instead, refer to Error Messages. The destination prompt is repeated to allow you to make any number of bootable disks. Enter **CTRL-C** when you are ready to terminate the LDCOPY session.

UTILITIES

LDCOPY

System Prompt Method

LDCOPY can be loaded and executed by entering a single command line of the form:

```
LDCOPY destination=source [switch]
```

To use this method, insert a disk containing LDCOPY.CMD in a disk drive (B is assumed in this example). Enter LDCOPY followed by a space. If you are transferring a system that currently resides on the system tracks of the source disk (i.e., it is a bootable disk), enter the letter of the destination drive (A-P) with a colon, an equal sign, and the letter of the source drive with a colon. For example:

```
A>LDCOPY A: =B:
```

If you are transferring a system from floppy to partition or from partition to floppy, enter the same command, but follow it with the proper file name. No extension other than .CMD is allowed. For example:

```
A>LDCOPY A: =B: BOOT207.CMD
```

You may add a switch in the form [N] to either command line (e.g., LDCOPY B: =A: [N]). This will force immediate execution of the command without further prompting. Obviously, both disks must be in the correct drives at the time the command is entered if this option is used.

If the switch is omitted, LDCOPY will verify your command with this message:

LDCOPY rel. x.xx

Copyright (c) 1983 Zenith Data Systems Corp.

```
Source on B
Destination on A
Press RETURN to continue;
otherwise enter CTRL-C to abort:
```

If the information is incorrect or you wish to abort the procedure, enter **CTRL-C**. Control will return to the operating system. If you press **RETURN** this prompt will appear:

```
Press RETURN when source is in drive B:
```

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LDCOPY

Switch disks, if necessary, to ensure the source disk is in the correct drive, then press **RETURN**. Ensure the destination disk is in the correct drive when this prompt appears:

Press **RETURN** when destination is in drive A:

The prompts for whether the correct disk is in the source and destination drives are included so LDCOPY can be used with computers having only one drive. Press **RETURN** to continue. When the transfer process is complete a verification will appear and control will return to the operating system:

LDCOPY successfully completed.
A>

If an error message appears instead, refer to Error Messages.

Help Screen

You may display a condensed version of these instructions by entering a question mark (?) after any prompt, or after LDCOPY in a command line (e.g., A>LDCOPY ?). If you enter a question mark, the following text will appear on your screen.

Use LDCOPY to create a bootable CP/M-86 disk.
(You must also use PIP with option R to copy the BIOS file, "CPM.SYS")

UTILITY PROMPT METHOD:

If you are copying from system tracks,
answer the Source: and Destination:
prompts with just a drive letter.

If you are copying from a .CMD file,
answer the Source: prompt in the form:
{drive} : {filename.CMD}
Answer other prompts with **RETURN** to
continue, or **CTRL-C** to abort.

EXAMPLES:

Source: B
Destination: A

Source: B:Boot207.CMD
Destination: A

UTILITIES

LDCOPY

SYSTEM PROMPT METHOD:

Enter one command line in the form:

LDCOPY{dest.drive}:={source drive}: [filename.CMD]

EXAMPLES:

A>LDCOPY B: =A:

B>A: LDCOPY B: =A: BOOT207.CMD

Error Messages

Insufficient memory

EXPLANATION: There is not enough free memory available in your computer system to run LDCOPY. Control is returned to the operating system.

Invalid command line format

EXPLANATION: A syntax error was made while you entered parameters.

Invalid destination

EXPLANATION: You entered a drive letter outside the range A-P, or you specified a drive not available on your system.

Invalid source

EXPLANATION: You entered a file name that was misspelled or not available on the specified drive, or you entered a drive letter outside the range A-P, or you specified a drive not available on your system.

LDCOPY is incompatible with current BIOS

EXPLANATION: The CP/M-86 system and the LDCOPY utility being used are not of the same version. Use a CP/M-86 system and LDCOPY utility copied from the same distribution disk. Then try LDCOPY again.

UTILITIES

LIST

The Utility that Prints Text File Contents on Paper

The LIST utility enables you to obtain paper copies of files by entering a command for one or more files to be printed. Special printout characteristics can be set when you enter the command with LIST parameters. You can stop a LIST printout in progress. LIST is used to print out only certain types of files.

Method of Entering LIST Commands

Two different methods can be used to enter LIST commands: the Utility Prompt Method and the System Prompt Method.

Utility Prompt Method

With the Utility Prompt Method, you enter LIST in response to the system prompt. This entry is sufficient to invoke LIST, which displays its own prompt—the asterisk (*). You can now enter the argument portion of the command line in response to the "*" prompt supplied by LIST. LIST prompt entries are made in the following form:

```
A>LIST RETURN
```

```
*{argument} RETURN
```

Where {argument} is the name of the file(s) to be listed.

After the LIST operation is finished, LIST again displays the "*" prompt. You can enter another argument or return to the operating system by pressing RETURN.

System Prompt Method

To invoke a LIST operation with a single command line, you must include the argument in the response to the system prompt, as in the following example:

```
A>LIST {argument} RETURN
```


UTILITIES

LIST

Where {argument} is the name of the file(s) to be listed.

After LIST finishes the latter printing operation, it automatically returns you to the operating system, and the system prompt is displayed.

For example, if you enter the following command using the Utility Prompt Method:

```
A>LIST RETURN
```

```
*REPORT.DOC RETURN
```

or this command using the System Prompt Method:

```
A>LIST REPORT.DOC RETURN
```

the results will be the same. Both commands will produce a paper copy of the file named "REPORT.DOC."

Printing Contents of More than One File

You can specify several files in a single LIST command. To initiate a listing of several files, enter the names of the files in the argument, separated by single spaces.

If the files to be listed reside on different disks, their names should be preceded by a drive specification (drive letter and colon).

Both of the following examples demonstrate how to LIST the contents of the specified files:

```
A>LIST RETURN
```

```
*PRINTOUT.DOC B:PROGRAM.PRN B:REPORT.DOC C:SYSTEMX.PRN RETURN
```

or

```
A>LIST PRINTOUT.DOC B:PROGRAM.PRN B:REPORT.DOC C:SYSTEMX.PRN RETURN
```

UTILITIES

LIST

LIST Parameters

You can specify parameters in a LIST argument to alter the characteristics of a standard printout. These parameters allow you to select printout characteristics such as the date, the number of copies desired, the width of tabs, etc. If no parameters are specified, LIST will print a document with default value characteristics.

The parameters used to specify printout characteristics are shown in the following table.

PARAMETER NAME	KEYBOARD ENTRY	DESCRIPTION OF PRINTOUT CHARACTERISTIC	DEFAULT VALUE
Date	[D xxx...x]	First 10 characters of specified date printed on upper right corner of each document page.	no date
Heading	[H xxx...x]	First 60 characters of specified heading printed on the left of top line of each document page.	file name (first copy only)
No Heading	[N]	No heading or date printed on any document page.	file name
Lines per Page	[L nn]	Each document page has the specified number of lines. Specification of zero lines/page causes printing without page breaks.	60 lines per page
Tab Stop Width	[T nn]	Each tab stop within text is expanded or contracted to specified number of spaces.	8 spaces
Page Number	[P nn]	Page numbering sequence begins with specified number on first file page.	page 1
Uppercase	[U]	All letters in document printed in uppercase.	upper- and lower-case
Copies Desired	[C nn]	Specified number of copies are printed.	1 copy
Erase	[E]	File is erased from disk after LIST operation is completed.	file retained on disk

UTILITIES

LIST

Use of LIST Command Line Parameters

Parameters are entered, enclosed in square brackets, after the last file name in the LIST command. If more than one parameter is entered, each should be enclosed in a set of brackets.

A LIST command entered with parameters using the Utility Prompt Method might appear as follows:

```
A>LIST RETURN
*PRINTOUT.DOC PROGRAM.PRN [H Today's Work] [D 31-Feb-81] [P 9] RETURN
```

This command will cause the contents of the files PRINTOUT.DOC and PROGRAM.PRN to be printed, with the following heading across the top of the first page of each file:

```
Today's Work                                     31-Feb-81 Page 9
```

The parameters will take effect on all of the files specified in that command line.

When you enter the command with the Utility Prompt Method, any parameters entered (except for the starting Page number parameter and Erase parameter) will remain in effect with any files specified at a successive asterisk (*) prompt, until new values are entered for the parameters or until control is returned to the operating system.

When you enter a LIST command line with the System Prompt Method, letters in the heading, date, and page number line will be automatically translated into uppercase. The following System Prompt command demonstrates this character translation:

```
A>LIST PRINTOUT.DOC PROGRAM.PRN [H Today's Work] [D 31-Feb-81] [P 9] RETURN
```

This command will cause the contents of the files PRINTOUT.DOC and PROGRAM.PRN to be printed with the following heading across the top of the first page of each file:

```
TODAY'S WORK                                     31-FEB-81 PAGE 9
```

UTILITIES

LIST

Aborting a LIST Operation

After a LIST command has been entered, the printout can be aborted by pressing any keyboard character while the printout is in progress. (If more than one copy has been requested, you must abort each copy.) LIST will then redisplay the asterisk prompt (under the Utility Prompt Method), or CP/M will display the system prompt (under the System Prompt Method).

Files that Should Be Listed

Only files containing ASCII characters should be listed. ASCII character files include files composed using a text editor (such as ED), or files with the "PRN" extension created by an assembler (such as ASM).

Files not composed of ASCII characters will produce meaningless printouts if listed.

Files composed in a word processor will LIST, but they might possess features (such as boldface characters or page breaks) that LIST will not print in the same way as the word processor's printout command.

LIST Error Messages

File not found

EXPLANATION: A file specified in the LIST command argument does not exist on the disk in the logged drive. If the file does exist on a disk, that disk should be inserted in a drive and the appropriate drive should be specified before the file name in the argument.

Syntax error in command line

EXPLANATION: The LIST command was improperly entered. This error often occurs if a space is not entered between file names, or when an invalid parameter is specified.

UTILITIES

RDDOS

*The Utility that Allows CP/M-86
to Read a Z-DOS Formatted Directory or File.*

Use the RDDOS utility to read a file directory on a Z-DOS formatted disk or to copy Z-DOS formatted data files into a CP/M readable format. When reading a directory on a Z-DOS formatted disk, RDDOS simply displays the directory in Z-DOS directory form while leaving the Z-DOS files themselves unaffected. When copying data files from a Z-DOS formatted disk, RDDOS makes CP/M compatible copies of the files while leaving the original Z-DOS formatted files intact.

You may execute either the RDDOS copy function or the RDDOS directory function using only the System Prompt method. With the System Prompt method, RDDOS is loaded into memory and all necessary parameters are supplied from a single command line.

In addition, there is both a brief and detailed version of the RDDOS help screen that you may invoke from the system prompt. A detailed description of these help screens and of the two primary RDDOS functions follows.

Reading a Z-DOS Directory

To read a file directory from a Z-DOS formatted disk, place a disk containing RDDOS.CMD into a drive (e.g., drive A) and enter a command line of the following form:

```
A>RDDOS DIR <d:>[<filespec>]
```

where RDDOS DIR instructs the system that you wish only to read a directory on a Z-DOS formatted disk;

where <d:> is the drive name where the Z-DOS disk resides. This is a required entry since the Z-DOS disk will always reside on a drive other than the default drive;

where [<filespec>] is any legal Z-DOS filename and extension that represent the file(s) you wish to see in the directory. You may also use wild cards. [<Filespec>] is an optional entry. If you do not enter a filename, RDDOS will display the entire Z-DOS directory.

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RDDOS

When you have completed this entry by pressing **RETURN**, the RDDOS banner will display on the screen:

RDDOS Rel. x.xx
Copyright (c) 1983 Zenith Data Systems Corp.

Below the banner, the directory of the Z-DOS formatted disk will appear on your screen in the five columns of the Z-DOS directory form: filename, extension, file size, date, and time. The system prompt, A> will appear after the directory listing.

Copying Files from Z-DOS Format into CP/M Format

To copy Z-DOS formatted files to CP/M formatted files, place a disk containing RDDOS.CMD into a drive (e.g., drive A) and enter a command line of the following form.

A> RDDOS <d:>[filename.ext][=<e:><filespec>

where RDDOS followed by the parameters instructs the system that you wish to copy Z-DOS formatted files into CP/M format;

where <d:> is the destination drive name. The destination drive should contain the CP/M formatted disk on which the copied file(s) will reside. This entry is required since the system must be told where to find the CP/M formatted disk.

where [filename.ext] is any legal filename and extension for the copy that will be created on the CP/M destination disk. This entry is also optional. If you do not specify a filename and extension, RDDOS will simply adopt the original filename and extension of the Z-DOS formatted file.

where <=> is required to separate the destination parameters from the source parameters.

UTILITIES

RDDOS

where <e:> specifies the source drive. The source drive should contain the Z-DOS formatted disk with the file(s) you wish to copy. This entry is required since the system must be told where to find the Z-DOS formatted disk.

where <filespec> is any legal filename and extension which represents the Z-DOS formatted file(s) you wish to copy to CP/M format. You may also use any valid combination of wild cards for the filespec.

When you have completed this entry by pressing **RETURN**, RDDOS will display its banner while it completes the copying function. When copying is complete, RDDOS will automatically return to the system prompt A>.

Help Screen

To invoke the help screen, type the following:

A>RDDOS ?

and press **RETURN**. The question mark entry tells the system that you want it to display the detailed version of Help. The following message appears on your screen:

RDDOS Rel. x.xx
Copyright (c) 1983 Zenith Data Systems Corp.

RDDOS reads a file, file group, or directory from a disk that has been formatted using a Z-DOS compatible system and will copy the file(s) to a disk having been formatted with CP/M.

The RDDOS command is similar to the PIP command except that the source file(s) are expected to be on a Z-DOS disk.

Usage: RDDOS [destination] source
--or-- RDDOS DIR drive

Where

"destination" a CP/M filespec or drive name, and "source" is a Z-DOS filespec.

When you have finished reviewing the detailed help message, the system prompt is displayed.

UTILITIES

RDDOS

Error Messages

Bad destination drive specified.

EXPLANATION: The drive name specified for the destination is outside the possible range of drives (A-P) or the drive is not available on your system. RDDOS will automatically abort. You may then rerun the program, entering the correct drive name.

Bad source drive specified

EXPLANATION: The drive name specified for the source is outside the possible range of drives (A-P) or the drive is not available on your system. RDDOS will automatically abort. You may then rerun this program, entering the correct source drive name.

Bad destination file name specified

EXPLANATION: The filename you have specified for the destination is invalid (e.g., it has too many characters or it contains characters that may not be used). RDDOS will automatically abort. You may then rerun the program, using a valid filename for the destination.

Bad source file name specified

EXPLANATION: The filename you have specified for the source is non-existent. RDDOS will automatically abort. You may then rerun the program, using the correct filename.

Bad memory request...allocation denied

EXPLANATION: The computer system does not have enough free memory to run the RDDOS program. RDDOS will automatically abort.

UTILITIES

RDDOS

Bad destination...directory full

EXPLANATION: There is not enough room on the destination disk to copy the file. RDDOS will automatically abort. You may then rerun RDDOS, using a disk with sufficient space to receive the copy.

Bad command line syntax

EXPLANATION: A syntax error was made while you entered parameters. RDDOS will automatically abort. You may then rerun the program, using the correct syntax.

UTILITIES

RESTORE

The Utility that Facilitates File Copying to Disks and/or Partitions for Active Use

The RESTORE utility makes it possible for you to access working files from the backup files produced by the BACKUP utility, and to copy them back to the media you use for your daily microcomputer tasks.

RESTORE is especially beneficial to Winchester disk users, because Winchester disk partitions hold so many files.

Because RESTORE works with both floppy disks and Winchester partitions, this text refers to recording media as "partition/disk" or "disk/partition" wherever it would be practical for you to use either a floppy disk or a Winchester partition.

RESTORE's function is complementary to the function of the BACKUP utility, which makes optimal use of disk space by storing working files inside of a special backup file.

RESTORE Operation

When the BACKUP utility copies individual files from a source partition/disk, it temporarily concatenates them to be stored as a single "backup file" on the destination medium. Thus the backup file is a long, continuous string of data including individual files that are joined by BACKUP and separated by RESTORE. The backup file also contains a directory that lists all of the files in the exact sequence they were copied.

Often BACKUP stores parts of the backup file on more than one disk. BACKUP accomplishes multi-disk storage by recording up to the absolute capacity of the distribution medium, prompting you to insert another disk, and then continuing to copy from where it left off. With this capability, BACKUP can even divide a file within the backup file between two disks. Each of the disks necessary to accommodate the entire backup file is called a "volume" of the backup file and is given a volume number.

The RESTORE and BACKUP utilities also enable you to view several statistics, such as the names of the files within a backup file, by entering special command line options.

UTILITIES

RESTORE

The BACKUP utility informs RESTORE of the sequence used to store backed up files by listing this sequence in the directory of the special backup file. Thus when RESTORE begins to restore files from the backup disk set, it reads the list of files from the backup file directory and restores them to the original medium in the listed sequence.

Invoking RESTORE

You can use the RESTORE utility through one of the following methods: the Utility Prompt Method or the System Prompt Method. You can also invoke a help screen to explain the RESTORE utility.

Utility Prompt Method

With the Utility Prompt RESTORE Method, you invoke the RESTORE utility from a disk by entering the command function at the system prompt and then entering the command argument at a prompt displayed by the RESTORE utility. The first entry under this method is in the following form:

```
A>RESTORE RETURN
```

After an entry in this form, RESTORE will display a message and prompt in the following form:

```
RESTORE Version x.xx  
Copyright (C) 1983 Zenith Data Systems
```

```
>>
```

At the >> RESTORE prompt, you should enter a command line argument in the following form:

```
>>{d}:{distfile},{d}:{distfile},...={s}:{sorcfiler}{x};...] RETURN
```

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RESTORE

Where {>>} is the RESTORE utility prompt;

where {d} is the optional name of the drive that is to receive the copies being transferred. This specification is necessary only if this destination drive is not also the default drive;

where {destfile} is one of the individual file names that is being extracted from within the backup file and copied to the destination medium, where it will (once again) be accessible by its own file name;

where {s} is the optional name of the drive from which the backup file is being copied (necessary only if the source drive is not also the default drive);

where {srcfile} is the primary name of the backup file. Wild card file name characters (* and ?) are not allowed; and

where {x} is any of the optional single letter options, separated by semicolons, that structure the RESTORE operation.

When RESTORE has completed the specified operation, it will redisplay the >> RESTORE prompt. You can continue entering command line arguments at RESTORE prompts indefinitely.

During the RESTORE operation, the RESTORE utility will display the names of each file that it copies in a vertical list.

When you wish to exit from the RESTORE utility to the operating system, press **RETURN** at a RESTORE prompt. Then CP/M will display the A> system prompt.

NOTE: Like all command lines entered through CP/M, the RESTORE command line can contain only 127 characters. If your command line is between 78 and 127 characters in length, you can keep the entire line visible on your video screen by entering **CTRL-E** after the 79th character.

UTILITIES

RESTORE

System Prompt Method

With this RESTORE method, you enter the command line function and the command line argument both at the system prompt, in the following form:

```
A>RESTORE {d}:{destfile},{d}:{destfile},...={s}:{srcfile} [{x};{x};...] RETURN
```

Where **RESTORE** is the command line function, stored in the file **RESTORE.COM** on the default or logged partition/drive;

where **{d}** is the optional name of the drive that is to receive the copies being transferred (necessary only if the destination drive is not also the default drive);

where **{destfile}** is one of the individual file names that is being extracted from within the backup file and copied to the destination medium, where it will (once again) be accessible by its own file name;

where **{s}** is the optional name of the drive from which the backup file is being copied. This specification is necessary only if this source drive is not also the default drive;

where **{srcfile}** is the primary name of the backup file. Wild card file name characters (* and ?) are not allowed; and

where **{x}** is any of the optional single letter options, separated by semicolons, that structure the RESTORE operation.

During the RESTORE operation, the RESTORE utility will display the names of each file that it copies in a vertical list.

After RESTORE has completed the specified operation, CP/M will display the A> system prompt.

NOTE: Like all command lines entered through CP/M, the RESTORE command line can contain only 127 characters. If your command line is between 78 and 127 characters in length, you can keep the entire line visible on your video screen by entering **CTRL-E** after the 78th character.

UTILITIES

RESTORE

Help Display

For Help Display, you enter the command line function and a ? (question mark) at the system prompt, as shown:

```
A>RESTORE ? RETURN
```

This command will cause the display of messages that summarize the purpose, command line, and options of the RESTORE utility. The system prompt will reappear below the RESTORE display.

This invocation method does not cause restoration of backed up files. It is designed to provide you with a convenient quick reference to a few aspects of the RESTORE utility.

RESTORE Source

A RESTORE command line can include only one source. When specifying this source, you must always specify the primary name of a file, and sometimes a drive.

The file specified as the source is the backup file into which all of the individual files were copied.

The source file specified in a RESTORE command line should be identified by a primary file name only (1-8 characters). The extension should not be specified, because the BACKUP utility has already applied extensions to each backup file volume. (BACKUP applies the extension "000" to the first backup file volume, "001" to the second, "002" to the third, etc.) During the RESTORE operation, you will be prompted to insert backup file disk volumes at appropriate times.

Wild card file name characters (* or ?) cannot be used to specify a source file.

Whenever a specified source (backup file) does not reside in the default drive, a drive name should be specified in front of it. You can restore files to any valid drive during a RESTORE operation.

UTILITIES

RESTORE

A source file specification is required in all RESTORE command lines except those entered with the [B] option, for the sole purpose of displaying characteristics of all of the master backup files on the default disk.

Consider an example where the primary file name "C:QUITTIME" is entered as source in a command line. The ensuing RESTORE operation required that five disks (backup file volumes) be inserted into drive C to completely disperse all of the individual files that had been stored within QUITTIME.

The source disks contained the following backup file volumes:

QUITTIME.000
QUITTIME.001
QUITTIME.002
QUITTIME.003
QUITTIME.004

The file "QUITTIME.000" was the master backup file volume, which contained the backup file directory.

RESTORE Destinations

A RESTORE command line can include one or more destinations. When specifying destinations, you must always specify a file, and sometimes a drive.

The destination files specified in a RESTORE command line should be identified by complete file names, including the primary name (1-8 characters) and the extension (1-3 characters if used).

Whenever a specified destination file does not reside on the default drive, a drive name should be specified in front of it. You can restore files to any valid drive during a RESTORE operation.

Wild card, or ambiguous, file names can be specified, using the * or ? wild card characters. (Wild card file names can be particularly useful when you have many files to copy, because a command line can contain a maximum of only 127 characters.)

UTILITIES

RESTORE

Any number of destination files can be specified in a command line (as long as the limit of 127 characters per command is not exceeded). However if two or more destination files are specified, they must be separated by commas.

A destination file specification is required in all RESTORE command lines except those entered with the [B] option, for the sole purpose of displaying characteristics of all of the master backup files on a disk; or in those entered with the [L] option, for the sole purpose of displaying a list of the individual files within a backup file.

The destination file specification

`*.ASC,TEST?,C:*.*`

would cause the release (from within the backup file) of all files with an .ASC extension to the default drive; all files (from the backup file) that are five characters long beginning with TEST and that have no extension (such as TEST0, TEST1, TESTS, TESTY, etc.) to the default drive; and all files (from the backup file) to drive C.

To further demonstrate the characteristics of destination file specifications:

`A:DEMO.*,B:SYSTEM.COM,E:82*.DOC,????*.DAT`

would cause the release (from within the backup file) of all files with DEMO as the primary name and any extension to the disk/partition in drive A; the file SYSTEM.COM to drive B; all files (from the backup file) that have a primary name beginning with 82 and that have a .DOC extension to drive E; and all files (from the backup file) that have a four-letter (or shorter) primary name with a .DAT extension to the default drive.

NOTE: Many of the individual files stored within the backup file may be identified by both the name of the file and the name of the drive from which they were originally copied. However, the drive name stored with the file name in the backup file does not affect the RESTORE operation in any way. In a RESTORE command line, the drive names you specify for destination files identify the drives to which you want the individual files to go as they are released from the backup file.

UTILITIES

RESTORE

RESTORE Options

The RESTORE utility enables you to structure any backup operation by specifying the following options in the command line:

- B** Backup directory—displays a directory listing statistics about all master backup files.
- E** Exception files—exclude exception files from RESTORE operation.
- L** List directory—list the directory of the backup files.
- O** Overwrite files—overwrite any existing files with the same name.
- Q** Query each—query yes or no on each file before restoring.
- R** Read only—overwrite read/only (R/O) files without prompt.
- S** System files—restore system files if specified.
- U** User number—restore files that were backed up from specified user area(s) in addition to the current user area.
- V** Verify—verify the file after restoring it.

Options are always the last items specified in a RESTORE command line. They must be enclosed within square brackets and separated by semicolons when more than one is used.

If a switch requires specification of files, then the option letter should be separated from these file specifications by a colon. When more than one file specification is necessary with a single option, then the file specifications should be separated by commas.

Options are entered in the following form:

`[{x};{x}:{details},{details},{details};{x};...]`

Where {x} is an option letter;

where {details} are additional character strings (such as the date, file names, or user numbers) that must be specified with some options;

UTILITIES

RESTORE

where the [] (square brackets) must enclose the options;

where the ; (semicolon) must separate multiple options;

where the , (comma) must separate the file names and/or user numbers used with some options; and

where the : (colon) must separate some option letters from accompanying {details}.

B—BACKUP Directory

The B option causes a directory display listing statistics about all of the master backup files (those backup files with the "000" extension) on a specified disk.

This directory lists the primary name of each master backup file, the number of volumes in the backup set that begins with each master, the number of files in each set of backup files, and the date of each backup operation.

Only the drive containing the master backup file(s) needs to be known in command lines entered for the sole purpose of producing a B option directory. Therefore, specify this drive in the command line unless it is the default drive.

You can use the B option in commands of the following form:

```
A>RESTORE {d}: [B] RETURN
```

Where RESTORE is the command line function, stored in the file RESTORE.COM on the default or logged partition/drive;

where {d} is the optional name of the drive that has received the copied files and stored them within backup file volumes (necessary only if the destination drive is not also the default drive); and

where [B] is the single-letter option that causes the display of master backup file features.

UTILITIES

RESTORE

The B option may be used with both methods of invoking RESTORE. For example, from the CP/M system prompt:

```
A>RESTORE C: [B] RETURN
```

or the same operation from the RESTORE utility prompt:

```
>>C: [B] RETURN
```

The B directory listing would appear in the following form:

Name	Volumes	Files	Date
QUITTIME	3	117	4-27-83
SAVEME	1	48	10-24-82
STORAGE	5	231	2-30-84

E—Exception Files

The RESTORE operation takes place for all of the files except that file given as an exception file. The file listed with the E option is then ignored during the operation. The E option is entered in the following form:

```
[E:{filespec},{filespec}]
```

Where E is the option;

where {filespec} represents files that are to be excluded from the operation (if they do not reside on the default drive, then you must also specify the name of the drive that contains them); You may use wild cards * and ? to specify groups of files; and

where the , (comma) and : (colon) are required separators.

For example:

```
A>RESTORE BACK1=*.DAT [E:TEMPFILE.DAT] RETURN
```

would RESTORE all files from the default drive that have a .DAT extension except the file named TEMPFILE.DAT, which would be omitted.

UTILITIES

RESTORE

L—List Directory

The L option causes RESTORE to give the internal directory of files that are contained within a specified backup file. The directory information would list the volume number where the files start and end, and the size of the file.

The L option is used for commands in the following form:

```
A>RESTORE {d}:{sorcfile} [L] RETURN
```

Where RESTORE is the command line function, stored in the file RESTORE.COM on the default or logged partition/drive;

where {d} is the optional name of the drive that has received the copies being transferred. This specification is necessary only if this drive is not also the default drive;

where {sorcfile} is the primary name of the backup file, which you wish to contain all of the individual files copied in this operation; and

where [L] is the single-letter option that causes the display of backup file directory features.

The L option may be used with both methods of invoking RESTORE. For example, from the CP/M system prompt:

```
A>RESTORE BACK9 [L] RETURN
```

or the same operation from the RESTORE utility prompt:

```
>>BACK9 [L] RETURN
```

The L directory listing will appear in the following form:

Filename	User	Start Volume	End Volume	Size in Kilobytes
TESTFIL1.DAT	0	1	1	3264
TESTFIL2.DAT	0	1	2	19582
TESTFIL1.DOC	11	2	3	7236
TESTFIL2.DOC	11	3	3	22230

4 file(s) on 3 volume(s)

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O—Overwrite Files

During operation, if RESTORE encounters a file with the same file name as the backup file, RESTORE asks if the file should be deleted with a message in the following form:

File {filename} already exists, do you wish to delete it (Y/N)?

When the O option is used, RESTORE overwrites the original copy of the file on the destination medium (the copy that “already exists”) without the query.

Q—Query Each

When the Q option is used, you are queried before each file is restored by a prompt in the following form:

Restore {x}:{destfile} to user {n} (Y/N)?

Where {x} is the drive containing an individual file that you specified for this operation (only displayed if it is not the default drive);

where {destfile} is an individual file from within the backup file that you specified for restoration; and

where {n} represents the number (0-15) of the user area to which the {destfile} will be restored.

A prompt in this form is displayed for each file RESTORE encounters that is contained within the backup file you specified as the source.

For example, if the current user area were 0 and you wanted to restore two .DOC files from the “BACK1” backup file on drive C to their individual file names in user area 0, and if the command to RESTORE were:

```
A>RESTORE B:*.DOC=C:BACK1 [Q] RETURN
```

then RESTORE would ask:

Restore B:FILE1.DOC to user 0 (Y/N) ?

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After you respond it would ask,

Restore B:FILE2.DOC to user 0 (Y/N) ?

In response to such a prompt, press **Y** or **y** to cause the file to be restored.
Press **N** or **n** to prevent the file from being restored.

R—Read/Only Files

The R option enables RESTORE to overwrite individual files that have read/only (R/O) status on the destination media without displaying a prompt.

As a default (in the absence of the R option), the following prompt is displayed if you are restoring individual files to destination medium where files by the same name exist with the read/only (R/O) status:

File {file name.ext} read only (R/O), do you wish to delete it (Y/N) ?

Where {file name.ext} is the complete file name of the file you are trying to restore.

NOTE: The STAT utility is used to apply read/only (R/O) or read/write (R/W) status to a file, as explained in the "STAT" text in the "User's Guide."

S—System Files

The S option allows RESTORE to restore files that are displayed in the directory (by the STAT utility) as system files. System files will not be restored merely because of this option, but only if this option is used in a command line where system files are specified as destinations.

If you do not include the S option in the command line, system files are ignored during the RESTORE operation—even if you specify these files as destinations in the RESTORE command line.

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U—User Number

The U option causes RESTORE to restore only the individual files within the specified user area(s). If you do not include a U option in the RESTORE command, then RESTORE will restore only the individual files to the current user area.

NOTE: CP/M enables you to divide each of your disks and partitions into 16 separate user access areas, numbered 0-15. When you boot up a partition or disk, you are working within user area 0 until you enter a USER command. See the "USER" text in the "User's Guide" for more information on user areas.

Specify the user option in the following form:

[U:n1,n2,...]

Where U is the option letter;

where : (colon) must separate the option letter from the user number(s);
and

where n1 stands for the number of one of the user areas to which RESTORE will restore individual files. If you specify more than one user area number, separate each with a comma.

You can specify as many as 16 user areas with a single U option. You can specify any user area(s) regardless of the user area currently being used.

V—Verify

The V option causes RESTORE to verify all files copied. With the V option, RESTORE reads each source file after it is copied to make sure that the source and destination copies are identical.

During a verified RESTORE operation, the names of the copied and verified files will be displayed in the following form:

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```
E:FILENAM1.EXT to user 12
Verifying E:FILENAM1.EXT
E:FILENAM2.EXT to user 12
Verifying E:FILENAM2.EXT
E:FILENAM3.EXT to user 12
Verifying E:FILENAM3.EXT
E:FILENAM4.EXT to user 12
Verifying E:FILENAM4.EXT
```

```
E:FILENAMn.EXT to user 12
Verifying E:FILENAMn.EXT
```

Runtime Prompting

After you invoke RESTORE and enter a command, RESTORE should begin to restore files, displaying the drive name and file name of each individual file as it is copied, in the following form:

```
E:FILENAM1.EXT to user 9
E:FILENAM2.EXT to user 9
E:FILENAM3.EXT to user 9
E:FILENAM4.EXT to user 9
```

```
E:FILENAMn.EXT to user 9
```

However, during an extensive RESTORE operation, you might be prompted to insert other specifically named disks.

If the BACKUP operation that created a backup disk set required more than one backup disk to accommodate all of the individual files, then a subsequent RESTORE operation will probably require that more than one disk be inserted to allow dispersal of the individual files.

The BACKUP utility kept track of the number and sequence of the disks used to accommodate the files and designated a "Volume" number for each disk that it prompted you to insert when creating the backup disk set.

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Thus the subsequent RESTORE operation must echo the prompts displayed by BACKUP to instruct you to reinsert the same disks in the proper sequence.

The RESTORE prompts that request reinsertion of the backup disk set volumes appear in the following form:

Insert backup volume {nnn}, {sorcfil}. {nnn-1}, in drive {x},
and hit RETURN when ready.

Where {nnn} is the number of the volume number of the disk RESTORE needs now in order to continue restoring individual files from the backup disk set;

where {sorcfil} is the primary file name that was applied to all of the backup files during the BACKUP operation;

where {nnn-1} is the file name extension of the particular disk that RESTORE needs now in order to continue restoring individual files from the backup disk set (this extension number is always one less than the corresponding volume number); and

where {x} identifies the source drive you specified in the RESTORE command line.

"Volume nnn" corresponds to the backup file with extension nnn - 1. The volume number is always one more than the number of the volume's file name extension.

In response to a prompt in this form, you should insert the specified volume (disk) in the specified drive. Then you should close the drive latch and press RETURN.

If RESTORE finds the backup file volume that it needed on the disk you just inserted, it will continue to restore individual files in sequence, displaying the drive and file names as they are restored.

If RESTORE cannot find the master backup file on the disk you just inserted, it will display a message in the following form:

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Can not open backup file, {sorcfil}. {nnn-1},
insert another disk in drive {x},
and hit RETURN when ready,
or hit any other key to abort.

Where {sorcfil} is the primary file name that was applied to all of the backup files during the BACKUP operation;

where {nnn-1} is the file name extension of the particular disk that RESTORE needs in order to continue restoring individual files from the backup disk set (this extension number is always one less than the corresponding volume number); and

where {x} identifies the source drive you specified in the RESTORE command line.

If you wish to complete the operation and can obtain the disk that contains the specified backup file, then insert this disk in the specified drive, close the drive latch, and press RETURN.

If you do not wish to continue the operation or cannot obtain the disk that contains the specified backup file, then press any key other than RETURN. The RESTORE operation will end and a prompt (utility or system prompt) will appear.

The BACKUP Master Volume

The first disk in the backup set is known as "volume 1," or the "master volume" of the backup file. This disk contains a file with the primary name that was specified in the command line as the destination, and with the extension "000."

Sometimes during the RESTORE operation, RESTORE will need to access the contents of the backup master volume. RESTORE displays a slightly different prompt when it needs to access this particular volume, as shown:

Insert backup master volume 001, {sorcfil}.000, in drive {x},
and hit RETURN when ready.

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Where the word "master" is added;

where the volume number is always "001" for a master volume, and

where the file name extension is always "000" for a master volume.

If RESTORE is prompting the master volume in particular, and you insert a disk that does not contain the master volume, then the error message displayed is also slightly different from that displayed when other volumes are needed, as shown:

```
Can not open master backup file, {sorcfile}.000,  
insert another disk in drive {x},  
and hit RETURN when ready,  
or hit any other key to abort.
```

Where the word "master" is added; and

where the file name extension is always "000" for a master volume.

Preparing RESTORE Routines

RESTORE can be very useful if you restore backups on a regular basis. RESTORE was designed so that you can store the RESTORE command lines that you enter regularly, so that they can be entered automatically, with far less typing.

To store RESTORE commands for automatic execution, you will need a text editor or word processor and the SUBMIT utility.

The text editor or word processor will enable you to prefabricate and store commonly entered RESTORE command lines in a disk file. The SUBMIT utility will enable you to type a short, simple command line that causes automatic execution of all the stored RESTORE commands.

This text explains a few RESTORE routines geared toward users of some popular application software products available for your computer system. The text for each routine shows you how to prepare the routine by explaining the following essential facts:

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- The type of user who would probably benefit from using the routine
- The names of the drives in which you should store particular files during the routine
- The form of the file you should create (with your text editor or word processor) to store commonly entered RESTORE command lines
- The form of the SUBMIT command you should type each time you wish to use the routine.

NOTE: To successfully prepare a RESTORE routine, you should understand the operation of the SUBMIT utility. For information on SUBMIT, refer to the "SUBMIT" text in the "User's Guide."

General Purpose RESTORE Routine

This routine can be helpful for anyone who wants to restore an entire backup disk set regularly. Steps 1 through 3 can be considered preparation steps that you need to perform only once. Steps 4 through 6 should be performed every time you conduct the routine.

1. Using a text editor or word processor, open a text file under the name **GNRESTOR.SUB**.
2. Into this file, enter the following command line:

`RESTORE $1:*. *=$2:GENBACK [V] RETURN`
3. Close the text file GNRESTOR.SUB.
4. Use the PIP utility to copy the text file GNRESTOR.SUB and the utility file SUBMIT.COM to drive A, if they are not there already.
5. When you are ready to perform this RESTORE routine, type **A:RETURN** to make drive A the default drive.
6. Type a command in the following form:

`A>SUBMIT GNRESTOR {partition} {floppy} RETURN`

Where {partition} is the drive letter of the Winchester disk partition to which you wish to restore your files; and

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where {floppy} is the drive letter of the floppy disk drive from which you wish to restore your files;

For example, if you wish to restore files from the backup with the primary name "GENBACK" in the drive A floppy disk to the drive C Winchester partition, then you should enter the following command:

```
A>SUBMIT GNRESTOR C A RETURN
```

RESTORE will restore all files from the backup file with the primary name "GENBACK" back to the partition under their individual file names.

SuperCalcTM RESTORE Routine

This routine can be helpful for anyone who wants to restore SuperCalc data files from an entire backup disk set regularly. Steps 1 through 3 can be considered preparation steps that you need to perform only once. Steps 4 through 6 should be performed every time you conduct the routine.

1. Using a text editor or word processor, open a text file under the name **SCRESTOR.SUB**.

2. Into this file, enter the following command line:

```
RESTORE $1:*. *=$2:SCBACK [V] RETURN
```

3. Close the text file SCRESTOR.SUB.

4. Use the PIP utility to copy the text file SCRESTOR.SUB and the utility file SUBMIT.COM to drive A, if they are not there already.

5. When you are ready to perform this RESTORE routine, type A: RETURN to make drive A the default drive.

6. Type a command in the following form:

```
A>SUBMIT SCRESTOR {partition} {floppy} RETURN
```

Where {partition} is the drive letter of the Winchester disk partition to which you wish to restore your files; and

where {floppy} is the drive letter of the floppy disk drive from which you wish to restore your files.

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For example, to restore SuperCalc data files from the backup file "SCBACK" on the drive A floppy disk to the drive C Winchester partition, enter the following command:

```
A>SUBMIT SCRESTOR C A RETURN
```

RESTORE will restore all files from the backup file with the primary name "SCBACK" back to the partition under their individual file names.

WordStar® RESTORE Routine

This routine can be helpful to users of the WordStar word processor who wish to regularly restore all WordStar text files that have the same file name extension. Steps 1 through 3 can be considered preparation steps that you need to perform only once. Steps 4 through 6 should be performed every time you conduct the routine.

1. Using WordStar's non-document editing mode, open a text file under the name **WSRESTOR.SUB**.
2. Into this file, enter the following command line:


```
RESTORE $1:*. $2=$3:WSBACK[V] RETURN
```
3. Close the text file WSRESTOR.SUB.
4. Use the PIP utility to copy the text file WSRESTOR.SUB and the utility file SUBMIT.COM to drive A, if they are not there already.
5. When you are ready to perform this RESTORE routine, type **A:RETURN** to make drive A the default drive.
6. Type a command in the following form:

```
A>SUBMIT WSRESTOR {partition} {ext} {floppy} RETURN
```

Where {partition} is the drive letter of the Winchester disk partition to which you wish to restore your files;

where {ext} is the one- to three-letter file name extension of the text files you wish to back up; and

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where {floppy} is the drive letter of the floppy disk drive from which you wish to restore your files;

For example, if you wish to restore WordStar text files that have the file name extension "DOC," and if these files are now within the backup file with the primary name "WSBACK" in the drive A floppy disk, and if you wish to restore to the drive C Winchester partition, then you should type the following command:

```
A>SUBMIT WSRESTORE C DOC A RETURN
```

RESTORE will restore all files from the backup file with the primary name "WSBACK" back to the partition under their individual file names.

Structure of BACKUP Files

The BACKUP utility backs up several primary files into a single backup file. This backup file contains all of the files that were copied, in the order they were specified. At the beginning of the backup file is a directory of the copied files. The BACKUP utility maintains this directory to show the names of the files within the backup file, so that the RESTORE utility, when used, will be able to copy the files to other media.

At the beginning of the backup file directory is an entry for the backup file itself. This backup file directory entry is a sequence of bytes that are stored in the following form:

<u>Field Function</u>	<u>Field Size (bytes)</u>
ID	1
File Control Block (FCB)	32
R	4
quantity of copied files	2
date of backup	2
R	7
release number	1
version number	1
R	14
	64 bytes

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Where *ID* is a byte that is set to one to distinguish this master backup directory entry from normal file directory entries;

where *File Control Block (FCB)* is a set of bytes that describe the drive name, primary file name, file name extension, and other characteristics used by CP/M to store files;

where *R* stands for reserved bytes that are not used for any particular purpose in this version of the software;

where *quantity of copied files* is the number of individual files stored within the backup file;

where *date of backup* is the date that the user entered in response to a prompt during the BACKUP operation; and

where *release number* and *version number* are included to ensure that this software will be used only with compatible releases and versions of BACKUP and RESTORE.

NOTE: The file name extension in the "File Control Block (FCB)" of the backup file directory entry is the file name extension of the last volume of the backup disk set—and not necessarily the extension of the volume that contains the directory. Thus you can determine how many volumes were used to accommodate all of the backed up files by looking at the directory in the first volume. (The first volume is the volume given the extension "000" during the BACKUP operation.)

Immediately following the backup file entry in the backup file directory are several sequences of bytes, each describing attributes of one of the individual files that were copied into the backup file during the BACKUP operation. The bytes of the individual file directory entry are stored in the following form:

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<u>Field Function</u>	<u>Field Size (bytes)</u>
ID	1
File Control block (FCB)	32
R	4
start volume	1
end volume	1
start position	2
end position	2
file length	2
U	1
R	18
	64 bytes

Where *ID* indicates the location of this individual file entry among the other individual file entries in the directory. If the value of this byte is 2, then the entry describes an individual file within the backup file. If the value of this byte is FF, then the entry is a "dummy" entry that merely signals the end of the backup file, and does not describe an individual file;

where *File Control Block (FCB)* is a set of bytes that describe the drive name, primary file name, file name extension, and other characteristics;

where *R* stands for reserved bytes that are not used for any particular purpose in this version of the software;

where *start volume* indicates the number of the first backup file volume used to accommodate this individual file;

where *end volume* indicates the number of the last backup file volume used to accommodate this individual file;

where *start position* is the number of 128-byte records between the beginning of the backup file volume and the beginning of this individual file;

where *end position* is the number of 128-byte records between the beginning of the backup file volume and the record following the end of this individual file;

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where *file length* is the length of this individual file, as measured in 128-byte records; and

where *U* is the number of the user area from which the individual file came.

The number of individual source files that can be backed up in a single BACKUP operation is limited by the amount of space on the first disk/partition used to receive the backup volumes. This disk/partition must have enough free space to accommodate the entire backup file directory.

NOTE: If any of the source files you specify are random files (as opposed to sequential files), these files might become larger when restored with the RESTORE utility.

RESTORE Error Messages

Verify error, try RESTORE again (Y/N)?

EXPLANATION: RESTORE has detected that the copy of a backed up file on destination media is different from the original copy of the file on the source media.

Press **Y** if you wish to have RESTORE try to recopy and verify the file that could not be verified. RESTORE will try to overwrite the copy of the file that could not be verified. Then RESTORE will resume displaying the names of the individual files as they are copied and verified, beginning with the file in which the verification error occurred.

Press **N** if you wish to skip the file that could not be verified. Then RESTORE will try to copy and verify the next individual file that is listed in the backup file.

Backup file name can not be ambiguous.

EXPLANATION: You specified * or ? wild card characters in the source file name for the RESTORE operation. Repeat the command specifying the source with an explicit file name.

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Extension on backup file specified.
Extension 000 will be assumed.

EXPLANATION: This occurs whenever you try to assign a backup file an extension by specifying a full file name for a destination file. If this occurs, RESTORE ignores the extension you specified and uses its standard, sequentially numbered extensions. Program operation will not be disturbed.

Can not find master backup file {file name}.000.

EXPLANATION: This message occurs when the /L option is requested for a file from a disk where the master backup {file name}.000, is not present.

File {file name}.{ext} is not found.

EXPLANATION: This message occurs whenever a file is specified for BACKUP or RESTORE and that file is not on the disk.

Invalid backup file.

EXPLANATION: This message occurs if the backup file specified in a command does not contain valid information. This may occur if the file specified was not a backup file, but had a "000" extension, or if the data in a backup file had degraded (possibly due to a bad sector or inadvertent exposure of the medium to an electromagnetic field).

Invalid drive designation.

EXPLANATION: This message occurs when a drive name is used that is not in the range of supported drive names (A through F).

Invalid exception file specifications.

EXPLANATION: This message will occur if the exception file specified has a syntax error in the specification.

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Invalid filename.

EXPLANATION: This message appears when a file name is specified that does not conform to CP/M file naming conventions.

Invalid selection file specifications.

EXPLANATION: This message is generally caused by a typographical error in the command line. The message results when parameters in the command line appear garbled or incorrectly punctuated.

Invalid option [x] specified.

EXPLANATION: This message occurs if RESTORE is unable to recognize the option that was specified in the command.

Not enough parameters specified.

EXPLANATION: This message results when the command to RESTORE is not complete enough for RESTORE to carry out the intended operation. Enter the command again specifying additional options or file, specifications.

Can not open master backup file {file name}.000,
insert another disk in drive x
hit RETURN when ready,
or hit any other key to abort.

EXPLANATION: This message occurs if the disk that has been inserted is not volume 1. Insert the correct disk.

Can not open backup file {file name}.{nnn},
insert another disk in drive x
hit RETURN when ready,
or hit any other key to abort.

EXPLANATION: This message occurs when you are asked to insert volume nnn+1 (which would contain {filename}.{nnn}) and the wrong disk is inserted. Insert the correct disk.

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Invalid user option.

EXPLANATION: This message occurs if the user number specified with the [U] option is not in the range 0-15 or if a user number was specified with improper syntax.

Invalid version of RESTORE for {file name.000}.

EXPLANATION: This message occurs if you have used different versions of RESTORE and BACKUP. Always use a copy of the RESTORE utility that bears the same version number as the BACKUP utility that you used to create backup file {file name.000}.

No files selected.

EXPLANATION: This message occurs if none of the source files you specified in the RESTORE command exist on the default or specified source media.

Out of disk space on restoration of {file name.ext}
insert another disk and hit RETURN
or hit any other key to abort

EXPLANATION: The disk to which you are trying to restore files does not contain enough blank space to accommodate an individual file. You should insert a disk that has enough space into the destination drive and press the **RETURN** key, or press a key other than the RETURN key and enter a RESTORE command with different destination file specifications.

APPENDIX

Introduction

The first four appendices, A-D, provide information about four utilities you must use if you plan to use CP/M-86 with a Winchester hard disk system. The utilities themselves — PART, PREP, SHIP, and VERIFY — are not included on the CP/M-86 distribution disks. Rather, these utilities are recorded on a disk that accompanies the Winchester hard disk hardware, and more information about them can be found in the Winchester Supplement of the Z-100 User's Manual.

The PART, PREP, SHIP, and VERIFY utilities perform important operations that prepare your Winchester hard disk to receive CP/M-86. The following list describes the operation performed by each utility. More detailed information can be found in the appendix devoted to each utility.

PART	The utility that rearranges Winchester Disk partitions and/or changes the partition used for default bootup.
PREP	The utility that initializes a Winchester Disk.
SHIP	The utility that moves read/write heads to a safe position.
VERIFY	The utility that isolates recent bad sectors on your Winchester Disk.

The last appendix, E instructs a user how to change the stepping rate in order to use CP/M-86 with non-Zenith hardware. **CAUTION:** This should not be done by users who are unfamiliar with the basic input output system.

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PART

The Utility that Rearranges Winchester Disk Partitions and/or Changes the Partition Used for Default Bootup

The PART utility enables you to change the quantity, size, and names of Winchester disk partitions. It also enables you to specify which partition should be accessed when you boot up. You do not need to run PART in order to use your Winchester disk, because a CP/M partition was prepared on the disk before it was shipped.

The PART utility is recorded on the Winchester Utility Disk, which is shipped with your Winchester disk hardware documentation. The PREP utility is also recorded on this disk. Although this disk runs under the Z-DOS Operating System, you can boot up with it — just as you would a CP/M disk.

CAUTION: Any changes you make to the quantity or size of partitions through PART can destroy all existing data on your Winchester disk. Therefore, you should back up all necessary data from all partitions before you use PART.

NOTE: After using the PART utility, you must enter **CTRL-RESET** and reboot the system with a floppy disk containing the CP/M-86 Operating System.

Partition Features

Winchester disks distributed by Zenith Data Systems or Heath have large storage capacities. To make practical use of all this storage space, it is divided into partitions. You can establish up to 16 CP/M partitions on your Winchester disk. You can also have partitions with other operating systems on the disk.

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PART

A partition behaves like a floppy disk in most operations, because you can access a partition's data and/or software by entering commands that refer to the drive name that has been designated for that particular partition. However, you can only access a CP/M partition through a drive name either by booting up to that particular partition, or by first running the ASSIGN utility.

NOTE: The exact capacity of your Winchester disk drive is determined by the drive's manufacturer and by the amount of usable disk space remaining after unusable space has been made inaccessible by software such as the PREP utility. Examples in this text show disk space totals for a Winchester disk that accommodates 10,000 kilobytes. However, it is possible that your disk will accommodate a different amount.

When your Winchester disk is shipped from the factory, it has already been prepared with two partitions. Each of these partitions occupies approximately one half of your total Winchester disk space. Each is also given a distinct name. One of these partitions is intended for use with the CP/M-86 Operating System and software that runs under CP/M-86. The other is intended for use of with the Z-DOS Operating System (sold separately) and software that runs under Z-DOS.

The PART utility enables you to view and change the status of the following partition features:

- Name of each partition.
- Name of the operating system to be placed on each partition.
- Approximate percentage of disk space allocated to each partition.
- Precise capacity of each partition in kilobytes (1024-byte units).
- Total (approximate) percentage of Winchester disk space that is and is not allocated to partitions.
- Total (precise) number of kilobytes of Winchester disk space that are and are not allocated to partitions.
- Name of the one partition that is accessed when you boot up without specifying a partition.

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PART

PART Operation

The PART utility enables you to change the status of partition features by typing different kinds of entries in response to prompts. During different phases of PART operation, features of the screen display will change and the cursor will move to the appropriate screen location after your entries. PART operation usually prompts you to make the following kinds of entries in sequence:

- 1) PART Invocation
- 2) PART Ratification
- 3) Choice of Operation
- 4) Partition Names
- 5) System Names
- 6) Allocation Percentages
- 7) Default Boot Partition Number
- 8) Choice of Operation
- 9) Choice of Exit Method

NOTE: If you wish to rearrange partitions, then you will probably repeat steps 4), 5), and 6) several times (once for each partition) before you perform step 7). If you merely wish to set a new default boot partition, then you will skip steps 4), 5), and 6).

PART Invocation

PART is recorded on the Winchester Utility Disk (supplied with your Winchester disk hardware and documentation) as an executable .COM file.

Entry Rules

To invoke the PART utility, enter the following command at the system prompt:

A:PART RETURN

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PART

NOTE: Enter the PART command at the Z-DOS system prompt just as you would at a CP/M system prompt.

Resulting Display

After it is invoked, the PART utility displays identification messages, a caution, and a prompt, as shown:

```
PART version x.xx
Copyright (C) 1982, Zenith Data Systems Corporation
```

The PART utility helps you to:

- * change the arrangement of your Winchester disk partitions and/or
- * select a partition (default boot partition) to which you can boot up without specifying the partition's name

PART displays a table showing the names of each partition (a partition name and a system name) and the amount of disk space allocated to each partition (in percentages and in kilobytes). PART also dynamically calculates and totals the kilobyte size of all partitions as you specify each partition's allocation percentage.

CAUTION: Using PART can destroy all files on your Winchester disk. Do not use PART until you have transferred backup copies of your Winchester disk files to floppy disks.

Proceed (Y/N)?

NOTE: The version number of the PART utility (shown in this example as "x.xx") might vary.

Error Conditions

If the PART.COM file is not on the disk you are using to run PART, you will receive the "Bad command or file name" error message. Try the command again after inserting a disk containing the PART.COM file into the drive. Use the **DIR RETURN** command at the "A:" system prompt to determine whether a disk has this file.

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PART

If the disk has been removed from drive A since bootup, you will receive a "Seek error reading drive A Abort, Retry, Ignore" error message. Insert a disk containing PART.COM in drive A, close the drive latch, and press **RETURN**.

If you try to run PART after booting up with a disk containing the CP/M-86 Operating System, then you will receive an error message in the form: "Bdos Err On X: Select". Reset the computer and boot up to the disk containing the Z-DOS Operating System and the PART.COM file. (We recommend that you use the Winchester Utility Backup Disk.) Then repeat the PART command at the A: system prompt.

PART Ratification

At the initial PART display, you have the choice of ratifying your intentions to use the PART utility as it is described in the displayed messages (and subject to the displayed caution), or exiting from the PART utility.

Continuing to use PART

An affirmative answer to this prompt verifies your intentions to continue using PART.

Entry Rules

Type **Y** at this prompt if you fully understand the consequences of using PART and still wish to continue.

CAUTION: Rearrangement of Winchester disk partitions can destroy any software or data now stored on the disk. Therefore we recommend that you make backup copies of any valuable software and/or data now stored on the Winchester disk before verifying your intentions to use PART.

NOTE: You can use PART to select a different "default boot partition" without destroying software or data, as long as you make no entries to change the arrangement of partitions.

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PART

Resulting Display

When you have ratified your intentions to use PART, the current status of several partition features is visible on a screen display of the following form:

	Partition Name	Operating System Name	Percentage	Kilobytes
	-----	-----	-----	-----
1.	Z-DOS	Z-DOS	50%	5000
2.	CPM	CPM	50%	5000
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				
11.				
12.				
13.				
14.				
15.				
16.				
	Total Utilization (Allocated/unallocated)		100/0	10000/0
	Default boot partition number: 1		<Z-DOS; Z-DOS	>

B - Modify default boot partition

P - Partition maintenance

E - Exit

Choose desired option. <B, P or E> .

The PART display shown above is the display that will appear the first time you run PART after shipment of a Zenith Data Systems (or Heath) Winchester disk, or after you have run the PREP utility. If you have already used PART since shipment or since running PREP, then some features of this display might appear differently.

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Declining to Use PART

Type any character other than Y or y if you do not wish to use PART at this time. The A: system prompt will be displayed.

Choice of Operation

After ratifying your intentions to use the PART utility, you have the choice of selecting a different default boot partition, changing the arrangement of your Winchester disk partitions, or exiting from PART.

A three-line menu enables you to select a PART operation by typing B, P, or E as the cursor flashes at the end of the prompt on the bottom of the screen.

Choosing to Modify Default Boot Partition

The default boot partition is usually the partition that you intend to use most often for booting up. Any established bootable partition that is selected as the default boot partition is the partition that will be automatically accessed when you type a bootup command without specifying a partition name. (In order to boot up to any other partition, you must specify the partition name, and sometimes the system name, in your bootup command.)

Entry Rules

Type **B** at this prompt to select a default boot partition. This operation will not prompt you to change the arrangement of any partitions. If you choose this activity refer to "Default Boot Partition Number" for further instructions.

APPENDIX A

PART

Resulting Display

After typing the **B** entry to "Modify default boot partition", the activities menu and prompt will be replaced by the Enter number of new default boot partition prompt. Additionally, the number and names of the current default boot partition will be replaced by the cursor on the display line beneath the table, as shown:

```

/\ /\ /\ /\ /\ /\ /\ /\ /\ /\ /\ /\ /\ /\ /\ /\ /\ /\ /\ /\ /\ /\ /\ /\ /\ /\ /\ /\ /\ /\ /\ /\ /\ /\ /\
15.
16.
Total Utilization (Allocated/unallocated)          100/0          10000/0
Default boot partition number: 1    <Z-DOS; Z-DOS          >
```

Enter number of new default boot partition.

When a display in this form appears, proceed to "Default Boot Partition Number".

Choosing Partition Maintenance

The "Partition maintenance" operation allows you to add partitions, remove partitions, change the names of partitions, and/or change the percentage of space allocated to partitions. Then this activity also prompts you to select a default boot partition.

Entry Rules

Type **P** at this prompt to begin changing the arrangement of partitions. The prompt to select default boot partition will appear.

APPENDIX A

PART

Resulting Display

When you choose the “Partition maintenance” operation, the cursor moves to the beginning of the first partition name in the table and the operations menu is replaced by a “Minimum allocation” message at the bottom of the display, as shown:

	Partition Name	Operating System Name	Percentage	Kilobytes
1.	Z-DOS	Z-DOS	50%	5000
2.	CPM	CPM	50%	5000
3.				

15.

16.

Total Utilization (Allocated/unallocated)	100/0	10000/0
---	-------	---------

```
Default boot partition number: 1 <Z-DOS;Z-DOS>
```

Minimum allocation = 2%

When a display in this form appears, proceed to "Partition Name."

Choosing to Exit

Type **E** at this prompt to exit from the PART utility completely. The A: system prompt will be displayed immediately.

Partition Name

After you have chosen the "Partition maintenance" operation, the cursor moves to the first character of a "Partition Name".

Changing or Adding a Partition Name

When the cursor moves to a position beneath the “Partition Name” column on the table, you can change the name of an existing partition or add a new partition to the table by entering the partition name as the first feature of this partition.

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PART

Entry Rules

A partition name is any string of *1-16 ASCII characters*, with the exception of the semicolon (;) and non-printing characters such as a space or tab. After entering this string, press the **RETURN** key. Then the cursor will move to the operating system name position for this partition.

PART will always display partition name letters (if any) in upper case, although you can enter them in either lower or upper case.

When the cursor arrives at the first character of a partition name, you will immediately erase the old partition name by pressing any key other than **RETURN** or the space bar.

While entering a partition name, you can press the **BACK SPACE** key to erase one character to left. If, when changing an old name, you press **BACK SPACE** until you have erased your entire new name, the old name will be redisplayed.

Partitions that you intend to give the same operating system name should be given different partition names.

Examples

The following examples are valid partition names:

CP/M _ ACCOUNTING	DATABASE	WORD/PROCESSING	George
Spread _ sheet	Z-DOS _ ACCOUNTING	Thelma	BASIC

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PART

Resulting Display

After you have entered 1-16 characters and pressed the RETURN key for a partition name, the new partition name will be displayed and the cursor moves to the operating system name position for this partition, as shown in the following partial display:

	Partition Name	System Name	Percentage	Kilobytes
1.	DATABASE	Z-DOS	50%	5000
2.	CPM	CPM	50%	5000
3.				
4.				



Error Conditions

If you press the semicolon key or the TAB key and then press the RETURN key, the partition name will appear to vanish while the other features for the partition remain. However when you have finished making an entry for this partition's allocation percentage, the old partition name for this partition will reappear.

You cannot finish PART operation after giving two partitions the same partition names unless they are given different system names. However, it will wait until you make an entry for the default boot partition before displaying the “duplicate name error” message in reverse video. If this message appears, you will have to correct the duplicate names before exiting from PART.

Bypassing a Partition Name

When the cursor moves to a position beneath the “Partition Name” column on the table, you can retain an old partition name and advance to the system name or stop rearranging the partitions completely.

Enter the number of the default boot partition.

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Removing a Partition

When the cursor moves to a position beneath the "Partition Name" column on the table, you can remove all features of this partition from the table.

Entry Rules

To remove a partition from the table without inserting a new partition in its place, simply press the **space bar**.

Resulting Display

The partition name, system name, allocation percentage, and allocation kilobytes for this partition will disappear. Then the features for all of the partitions below will move up one number. The cursor remains in the same position, although it now blinks at the partition name of a different partition.

If the partition you have removed was the default boot partition, then the "is undefined" message will be displayed.

Additionally, the "Total Utilization" (in both percentage and kilobytes) will show a different amount of "unallocated" space in reverse video (unless the removed partition was allocated zero percent of the disk).

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The following partial display shows how the screen might appear after you remove a partition:

	PartitionName	Operating System Name	Percentage	Kilobytes
	-----	-----	-----	-----
1.	CPM	CPM	50%	5000
2.				
3.				
4.				
				
15.				
16.				
	Total Utilization (Allocated/unallocated)		50/50	5000/5000
	Default boot partition number: is undefined			

Minimum allocation = 2%

Error Condition

If you remove a partition that was the default boot partition, then the "is undefined" message will be displayed until you make an entry for the default boot partition. If you then press RETURN to bypass setting the default boot partition feature, PART will display the "boot partition error" message in reverse video and prevent you from exiting from PART.

Operating System Name

After you have pressed the RETURN key during a partition name entry, the cursor moves to the first character of an "Operating System Name".

System names are not mandatory for partitions, although they must be used when the same partition names are used for different partitions.

Changing a System Name

When the cursor moves beneath the "Operating System Name" column on the table, you can change the system name of a partition.

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PART

Entry Rules

A system name is a string of *1-10 ASCII characters*, with the exception of the semicolon (;) and non-printing characters such as a space or tab. After entering this string, press the **RETURN** key.

PART will display system name letters in upper case, although you can enter them in either lower or upper case.

When the cursor arrives at the first character of a system name, you can immediately erase the old system name by pressing any key other than RETURN.

While entering a system name, you can press the **BACK SPACE** key to erase one character to left. If, when changing an old name, you press **BACK SPACE** until you have erased your entire new name, the old name will be redisplayed.

The same system name can be used for several partitions, as long as the partition names are different.

Example Entries

The following examples are valid operating system names:

CPM Z-DOS UNDER-DOS Acronym-DOS

NOTE: The Z-DOS operating system requires that you use the operating system name "Z-DOS" (as it is spelled here) for the partition(s) you plan to use for Z-DOS programs. We recommend that you use the operating system name "CPM" for the partitions you plan to use for CP/M programs, although CP/M does not require any particular system name.

If you press the semicolon key or the TAB key or the space bar and then press the RETURN key, the operating system name will appear to vanish while the other features for the partition remain. However when you have finished making an entry for the default boot partition, the old system name for this partition will reappear.

APPENDIX A**PART****Bypassing the System Name**

When the cursor moves beneath the "Operating System Name" column on the table, you can retain the old system name (or leave this feature blank) and skip ahead to the same partition's allocation percentage.

Entry Rules

To refrain from changing a system name, press only the RETURN key.

Resulting Display

The RETURN only entry causes the cursor to move ahead to the percentage feature of the same partition, without making any change to the system name, as shown in the following partial display:

Partition Name	System Name	Percentage	Kilobytes
-----	-----	-----	-----
1. DATABASE	Z-DOS	50%	5000
2. CPM	CPM	50%	5000
3.			
4.			
			

Allocation Percentage

After you have made an entry at an "Operating System Name" position, the cursor moves to the "Percentage" position for the same partition.

Setting a Percentage

When the cursor moves to the first digit of a "Percentage" (of Winchester disk space allocation), you can set an allocation percentage.

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Entry Rules

You must enter percentages by typing a whole **number in the range n-100**, where **n** is the number displayed at the bottom of the screen on the right side of the "Minimum allocation" message.

The percentage you enter for a CP/M partition must also be low enough so that this partition will not be larger than 8 megabytes (8192 kilobytes). (If you allocate more than 8 megabytes to a partition, CP/M-86 will not be able to access part of this partition.)

NOTE: Different brands and models of Winchester disk require different minimum allocations.

Resulting Displays

For every allocation percentage you enter, PART automatically calculates the exact number of kilobytes that should be allocated to a partition according to the percentage you entered. PART also automatically calculates the total quantity of percentage and kilobytes that are allocated and unallocated.

If you set an allocation percentage that brings the total allocation of disk space to 100 percent, and if you are entering it for one of the first 15 partitions on the table, then the cursor will move down to the partition name position of the next partition (whether this partition has been established yet or not) and the screen will appear in the form of the following partial display:

	Partition Name	Operating System Name	Percentage	Kilobytes
	-----	-----	-----	-----
1.	DATABASE	CPM	30%	3000
2.	CPM	CPM	70%	7000
3.	-			
4.				
				
15.				
16.				
Total Utilization (Allocated/unallocated)			100/0	10000/0
Default boot partition number: is undefined				

Minimum allocation = 4%.

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If you set an allocation percentage that brings the total allocation of disk space to 100 percent, and if you are entering it for the 16th partition on the table, then the cursor will move down to the default boot partition position and the screen will appear in the form of the following partial display:

Partition Name	Operating System Name	Percentage	Kilobytes
-----	-----	-----	-----
1. DATABASE	CPM	6%	600
2. SPREAD-SHEET	CPM	6%	600
			
15. COBOL	UNDER-DOS	6%	600
16. FUN&GAMES	ACRONYM-DOS	10%	1000
Total Utilization (Allocated/unallocated)		100/0	10000/0
Default boot partition number: -			

Enter number for the default boot partition.

NOTE: If you establish 16 partitions on your disk, and have not allocated all of the disk space with your percentage entry for the 16th partition, PART will automatically allocate all of the remaining disk space to the 16th partition — no matter how much space you try to allocate to this partition.

If you set an allocation percentage that brings the total allocation of disk space to less than 100 percent, and if you are entering it for one of the first 15 partitions on the table, then the cursor will move down to the partition name position of the next partition (whether this partition has been established yet or not). Additionally, the "Total Allocation" figures will display the amount of "unallocated" space (in both percentages and kilobytes) in reverse video. The screen will appear in the form of the following partial display:

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Partition Name	Operating System Name	Percentage	Kilobytes
-----	-----	-----	-----
1. DATABASE	CPM	50%	5000
2. CPM	CPM	20%	2000
3. -			
4.			
			
15.			
16.			
Total Utilization (Allocated/unallocated)		70/30	7000/3000
Default boot partition number:			

Minimum allocation = 2%

NOTE: You can exit from PART with part of your disk unallocated.

Error Conditions

PART will monitor the percentages you enter for each partition, and dynamically lower any percentage you enter if it would have brought the total allocation to more than 100 percent of disk space. Thus PART will never allow you to allocate more than 100 percent of your Winchester disk space, and the displayed percentages will never total more than 100.

PART keeps the total allocation percentages at or below 100 percent by subtracting percentage points from partitions, starting with the partitions at the bottom of the table. In cases of extreme over allocation, PART might even reduce the allocation percentages of some partitions to zero percent.

The minimum possible allocation percentage, which differs depending on the kind of Winchester disk you have purchased, is displayed at the bottom of the screen whenever you are in position to enter an allocation percentage. If you enter an allocation percentage lower than the minimum limit for your Winchester disk, PART will automatically convert this percentage to zero percent.

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Whenever the percentage of a partition is zero percent, PART will prevent you from exiting until you have changed this percentage to a value at or above the minimum percentage allowed for your own particular Winchester disk.

If you try to enter a non-numeric character, a fractional or decimal point number, or a number greater than 100, then the terminal will beep and the cursor will remain at the percentage position. Then you can enter a valid number.

You can exit from PART after allocating less than 100 percent of the disk space to partitions. The unallocated space on your Winchester disk will be inaccessible until you use either the PART utility or the PREP utility.

Bypassing the Percentage

When the cursor moves to the first digit of an existing "Percentage" (of Winchester disk space allocation), you can skip ahead to the partition name of the next partition, or skip ahead to the default boot partition number.

Entry Rules

To retain the percentage that is currently displayed for a partition and skip ahead to another partition feature, press the RETURN key only.

Resulting Displays

The displays that result after you have bypassed a percentage entry are similar in form to those that appear when you enter a number, although the percentage of the partition for which you just made the entry will not change.

The cursor will move to the partition name position for the next partition, unless you have just bypassed the percentage for the 16th partition in the table, in which case the cursor will move down to the default boot partition position.

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Error Conditions

If you bypass the percentage feature for a newly established partition (by specifying no number and pressing the RETURN key), then PART will display "0%" for this partition. Additionally, the "allocation error" message will appear in reverse video when the operations menu reappears. Furthermore, you will be prevented from exiting from PART until you correct the partition table so that no partitions are allocated "0%" of the disk space.

Default Boot Partition Number

After you have either chosen the "Modify default boot partition" operation or finished a "Partition maintenance" operation, the cursor will move to the default boot partition position. The current default boot partition number and names will vanish from the display.

Selecting a Default Boot Partition

When the cursor moves to the default boot partition position, you can select a different partition to be accessed during bootup.

The default boot partition position is at the right side of the "Default boot partition number:" message. When the cursor moves to this position, the number and names of the current default boot partition vanish from the display, and the "Enter the number of the new default boot partition." message appears at the bottom of the screen.

Entry Rules

To establish a default boot partition, you must enter the *number of an established partition* and press RETURN.

This number must be in the range 1-16. It must be listed in the table to the left of an established partition name. The number, partition name, and system name of the partition you specify by number will be displayed between angle brackets.

PART

If you enter 3 as your default boot partition number, and if line 3 on your partition table looks like the following:

3. WORD/PROCESSING	CPM	15%	1500
--------------------	-----	-----	------

then part of the display showing your new default boot partition number will appear as follows:

PartitionName	Operating System Name	Percentage	Kilobytes
-----	-----	-----	-----
1. DATABASE	CPM	30%	3000
2. SPREAD-SHEET	CPM	30%	3000
3. WORD/PROCESSING	CPM	15%	1500
4. BASIC	Z-DOS	25%	2500
5.			

15.

16.

Total Utilization (Allocated/unallocated)	100/0	10000/0
---	-------	---------

Default boot partition number: 3 <WORD/PROCESSING;CPM

B - Modify default boot partition

P - Partition maintenance

R - Restore to original partitions

E - Exit

Choose desired option. <B, P, R or E>

NOTE: The operations menu is displayed beneath the default boot partition number as soon as you make an entry for this feature. Proceed to “Entering Choice of Operation” for instructions on using this menu at this stage of the program.

If you try to enter a number (in the 1-16 range) for which there is no established partition on the table, the invalid number will vanish and the cursor will remain at the number position until you enter a valid number and press RETURN.

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If you try to enter a number that is out of the 1-16 range, the computer beeps and the cursor remains at the number position until you enter a valid number and press RETURN.

Bypassing the Default Boot Partition

When the cursor moves to the default boot partition number, you can retain the current default boot partition and advance to the PART operations menu.

Entry Rules

To bypass changing the default boot partition feature, press only the **RETURN** key at this position.

Resulting Display

The number and names of the current default boot partition will be redisplayed, and the cursor will move to the "Choose desired option" prompt beneath the operations menu, as shown:

```
\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\
15.
16.
Total Utilization (Allocated/unallocated)      100/0      10000/0
Default boot partition number: 1 <DATABASE; CPM      >
  B - Modify default boot partition
  P - Partition maintenance
  R - Restore to original partitions
  E - Exit
Choose desired option. <B, P, R or E> _
```

Proceed to "Entering Choice of Operation" for instructions on using the operations menu at this stage of the PART utility.

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Error Condition

If you have caused the default boot partition feature to become undefined by removing a partition from the table (as explained in “Removing a Partition”), and then bypass the default boot partition, you will still encounter the “boot partition error” message, as shown in the following partial display:

```

/\ /\ /\ /\ /\ /\ /\ /\ /\ /\ /\ /\ /\ /\ /\ /\ /\ /\ /\ /\ /\ /\ /\
15.
16.
Total Utilization (Allocated/unallocated)          100/0           10000/0
Default boot partition number: is undefined
boot partition error
    B - Modify default boot partition
    P - Partition maintenance
    R - Restore to original partitions
Choose desired option. <B, P or R>-

```

Furthermore, you will not be able to exit from PART until you either enter the number of an existing partition or remove the default boot partition.

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Removing the Default Boot Partition

When the cursor moves to the default boot partition number, you can remove this feature altogether and advance to a PART operations menu.

Entry Rules

To remove the default boot partition, press the **space bar** only.

Resulting Display

The "is undefined" message will be displayed at the default boot partition position. However, you will not encounter the "boot partition error" message. Additionally, the operations menu and prompt appear, as shown in the following partial display:

```
\/\ /\ /\ /\ /\ /\ /\ /\ /\ /\ /\ /\ /\ /\ /\ /\ /\ /\ /\ /\ /\ /\ /\ /\ /\ /\ /\ /\ /\ /\ /\ /\ /\ /\ /\
15.
16.
Total Utilization (Allocated/unallocated)      100/0      10000/0
Default boot partition number: is undefined
  B - Modify default boot partition
  P - Partition maintenance
  R - Restore to original partitions
  E - Exit
Choose desired option. <B, P, R or E> -
```

Refer to "Entering Choice of Operation" for instructions on using the operations menu at this stage of the PART utility.

NOTE: If you remove the default boot partition, you will have to enter bootup commands that specify partition names (and possibly also operating system names) in order to boot up with any partition.

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Entering Choice of Operation

After you completed a PART operation (such as "Modify default boot partition" or "Partition maintenance"), the operations menu will appear.

This menu is the same as the menu explained in "Choice of Operation", with the addition of the "R – Restore to original partitions" operation.

NOTE: If you have encountered an error condition, the "E – Exit" operation might not be displayed. Therefore you must choose one of the operations that enables you to change partition features, and correct the error condition before PART will allow the "E – Exit" operation.

Choosing to Modify Default Boot Partition

The partition that is selected as the default boot partition is the partition that will be automatically accessed when you type a bootup command without specifying a partition name.

Entry Rules

Type **B** at this prompt to select a default boot partition.

Resulting Display

After typing the B entry to "Modify default boot partition", the activities menu and prompt will be replaced by the "Enter number of new default boot partition" prompt. Additionally, the number and names of the current default boot partition will be replaced by the cursor on the display line beneath the table.

When a display in this form appears, refer back to "Default Boot Partition Number" for further instructions.

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Choosing Partition Maintenance

The "Partition Maintenance" operation allows you to add partitions, and/or change the percentage of space allocated to partitions. Then this activity also prompts you to select a default boot partition.

Entry Rules

Type **P** at this prompt to begin changing the arrangement of partitions.

Resulting Display

When you choose the "Partition maintenance" operation, the cursor moves to the beginning of the first partition name in the table and the operations menu is replaced by a "Minimum allocation" message at the bottom of the display.

When a display in this form appears, refer back to "Partition Name" for further instructions.

Restoring Partition Features

When the cursor moves to the "Choose desired option." prompt, you can end the PART session, rearrange your partitions starting either with your most recent entries or with the partition features set as they appeared when you invoked PART, or reselect a default boot partition starting either with your most recent entries or with the default boot partition that was set when you invoked PART.

Entry Rules

Type **R** if you want each partition feature to revert to its status at the time you invoked the PART utility.

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Resulting Display

When you choose the "R – Restore to original partitions" operation, PART will redisplay the operations menu without the "R – Restore to original partitions" option. The partition table will show the names, allocations, and default boot partitions that were already established when you invoked PART, as shown in the following display:

Partition Name	Operating System Name	Percentage	Kilobytes
-----	-----	-----	-----
1. Z-DOS	Z-DOS	50%	5000
2. CPM	CPM	50%	5000
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
13.			
14.			
15.			
16.			
Total Utilization (Allocated/unallocated)		100/0	10000/0
Default boot partition number: 1		<Z-DOS;Z-DOS	>

B – Modify default boot partition
 P – Partition maintenance
 E – Exit
 Choose desired option. <B, P or E> -

NOTE: This display is identical to the display presented in "Choice of Operation".

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Error Conditions

If you enter a character other than B, P, R, or E, PART will cause the computer to beep and the cursor to remain at the end of the prompt until you enter a valid letter.

Beginning the Exit Operation

When you exit from the PART operation after changing any partition features (through the "Modify default boot partition" or "Partition maintenance" operations), you will have to choose this operation and then make an entry at another menu.

Entry Rules

Type **E** if you wish to exit from the PART utility.

Resulting Display

When you choose the "E – Exit" operation, the following exit menu and prompt will be displayed at the bottom of the screen:

- M – Make changes and exit
- A – Abort, make no changes and exit

Choose desired option. <M or A> _

Error Conditions

If you enter a character other than B, P, R, or E, PART will cause the computer to beep and the cursor to remain at the end of the prompt until you enter a valid letter.

Choice of Exit Methods

When you choose the "E – Exit" operation after changing partition features, the final exiting menu appears.

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CAUTION: Before typing an entry at this menu, review the partition table carefully to be certain that your partitions are allocated as you want them. Remember that any rearrangement of partitions can destroy data on the Winchester disk, and that no changes are actually made to the Winchester disk until you enter the M option.

NOTE: Regardless of the exit method you choose, you will have to enter **CTRL-RESET** and reboot the system after exiting from PART.

Making Changes to the Winchester Disk

When the cursor moves to the prompt beneath the final exit menu, you can change the partition features according to your entries and then exit from PART.

Entry Rules

Type **M** if you want to exit from the PART utility and change the status of Winchester disk partition features to reflect the changes that you entered during this PART session.

CAUTION: This entry has the potential to destroy any data that might exist on the Winchester disk.

Resulting Display

After you choose and enter the "Make changes" option the Z-DOS system prompt will appear, as shown:

A:

Error Conditions

If you enter a character other than M or A, PART will cause the computer to beep and the cursor to remain at the end of the prompt until you enter a valid letter.

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Aborting Changes to the Winchester Disk

When the cursor moves to the prompt beneath the final exit menu, you can nullify all of the changes you have entered while exiting from PART.

Entry Rules

Type **A** if you want to end this PART session without any changes to the Winchester disk.

Resulting Display

After you choose and enter the "Abort" option, the Z-DOS system prompt will appear as shown:

A:

NOTE: Each partition feature will revert to the status it maintained before you invoked the PART utility. Any and all changes you may have entered during this PART session will be nullified, as if you had not even invoked PART.

Error Conditions

If you enter a character other than M or A, PART will cause the computer to beep and the cursor to remain at the end of the prompt until you enter a valid letter.

APPENDIX A

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The Superblock

NOTE: Information concerning the superblock is not essential for use of the PART utility or the Winchester disk. This information is provided for users who wish to obtain a deeper understanding of some of the activities that PART performs in order to partition a Winchester disk.

Winchester disk space is allocated according to information contained within a unit of software that is stored on a reserved area of the Winchester disk. This unit of software is called the “superblock”.

The superblock is a unit of Winchester support software that enables you to access specific partitions. The superblock is initially recorded on your disk when you use the PREP utility.

The superblock is also recorded on Winchester disks obtained from Zenith Data Systems or Heath — whether or not you use the PREP utility.

To insure the integrity of the superblock information, two copies of the superblock are recorded on the disk. These copies are named “Superblock A” (the copy used in most cases) and “Superblock B” (a backup copy used only when Superblock A is unusable).

After you use PART to change partitioning features (such as partition name, system name, allocation percentage, and default boot partition), PART updates both copies of the superblock and other Winchester support software units. Other Winchester support software units are explained in the text entitled “The Reserved Winchester Area” in the PREP utility section of this Appendix.

The information within each copy of the superblock resembles the information shown on the partition table that is displayed when you use the PART utility. The superblock is structured as shown in Table A-1.

APPENDIX A**PART**

	16 bytes	10 bytes	1 byte	3 bytes
1.	Partition Name	System Name	flag	Start Sector
2.	Partition Name	System Name	flag	Start Sector
3.	Partition Name	System Name	flag	Start Sector
4.	Partition Name	System Name	flag	Start Sector
5.	Partition Name	System Name	flag	Start Sector
6.	Partition Name	System Name	flag	Start Sector
7.	Partition Name	System Name	flag	Start Sector
8.	Partition Name	System Name	flag	Start Sector
9.	Partition Name	System Name	flag	Start Sector
10.	Partition Name	System Name	flag	Start Sector
11.	Partition Name	System Name	flag	Start Sector
12.	Partition Name	System Name	flag	Start Sector
13.	Partition Name	System Name	flag	Start Sector
14.	Partition Name	System Name	flag	Start Sector
15.	Partition Name	System Name	flag	Start Sector
16.	Partition Name	System Name	flag	Start Sector
17.	blanks	blanks	blanks	Start Sector
	16 bytes	10 bytes	1 byte	3 bytes

Table A-1 Superblock Structure

APPENDIX A

PART

NOTE: The superblock does not include all of the software necessary to facilitate Winchester disk access. Other Winchester support software, used for Winchester bootup and isolation of unusable disk media, are explained in the text entitled "The Reserved Winchester Area" in the PREP utility section of this Appendix.

The Start Sector

The structure of the superblock is similar to the layout of the partition table that is displayed while you are using PART. For each partition, it contains a partition name (1–16 characters) and an operating system name (1–10 characters).

However, in undating the superblock, PART converts the allocation percentages that you entered into a different kind of statistic that can be used during partition access to determine where a partition begins and ends. PART converts the percentage value into the number of the start sector of each partition.

Although you can establish only 16 partitions on the Winchester disk, there are 17 partition entries defined in the superblock. The size of each partition is determined by the difference between the "Start Sector" values of adjacent partitions.

It is necessary to define a 17th partition so that the size of the 16th partition (if established by the user) can be calculated by subtracting the start sector value of the 16th partition from the start sector value of the 17th partition.

The partition preceding the first partition that has spaces (20H) entered for its partition name will be considered to be the last usable partition defined in the table. The start sector of this partition will be one greater than the last sector allocated. The partition name entry for the 17th partition is always spaces.

APPENDIX A

PART

The Flag Byte

Partitions are also labeled with a flag byte.

The flag byte contains special information about the partition. For this version of the PART utility, only the high order bit is defined. This bit is set to one whenever PREP is run, or whenever PART is run with PART changes being made. The operating system that is eventually recorded on the disk can reset this byte when the system's formatting utility is run on the partition.

The FORMAT utility supplied with this version of CP/M-86 does not use or set this flag byte.

Disk Space Calculation

The PART utility allocates portions of Winchester disk space using 512-byte sectors as the primary unit of measure, and converts the quantities of sectors (512-byte units) into kilobytes (1024-byte units) for the totals displayed on the screen. PART determines how much space to allocate by performing the following internal operations in sequence:

1. observing the total size of the Winchester disk being used,
2. monitoring the percentages you enter,
3. calculating the number of sectors that is closest to this percentage,
4. converting sectors to kilobytes, and
5. displaying this kilobyte quantity on the screen.

Thus the amount of disk space that is actually allocated will not always be exactly equal to the percentage you entered, but rounded to the nearest kilobyte.

If you enter an allocation percentage that is greater than the remaining space percentage on the disk, then PART will calculate the number of kilobytes of space remaining on the disk, calculate this amount to the nearest one percent, and display this remaining percentage instead of the percentage that you tried to enter.

APPENDIX A

PART

Because of PART's rounding of space portions to the nearest percentage, the percentages allocated to your partitions might not always add up to exactly 100 percent when the disk is full. Furthermore, this rounding can also cause partitions that were divided into equal percentages to have slightly unequal kilobyte capacities.

Verifying the Superblock

PART updates information in Superblock A and Superblock B at the locations where these superblock copies were initially recorded (by the PREP utility). By spacing these two copies of the superblock several sectors apart, PART decreases the chance that both copies could be damaged simultaneously.

A checking code called a "checksum" is calculated by PART for each of the copies of the superblock before PART records these superblock copies on the Winchester disk. The results of these checksums are recorded in a data structure known as the Software Boot Code (see text entitled "The Reserved Winchester Area" in the PREP utility section of this Appendix.)

Then, when execution of either PART or PREP is repeated on the same Winchester disk, the utility first performs checksums to verify that the superblocks have not changed since the original checksums were performed.

If the PART utility encounters difficulty in reading Superblock A, or if the results of the second checksum of Superblock A differ from the results of the original checksum, then PART tries to read Superblock B.

If the PART utility encounters difficulty in reading Superblock B, or if the results of the second checksum of Superblock B differ from the results of the original checksum, then PART will display an error message.

APPENDIX A

PART

PART Error Messages

Allocation error

You have established one or more partitions that are presently allocated zero percent of the disk. (PART might have subtracted from the original amount of space you allocated to these partitions when you allocated too much space to other partitions.) You must repeat the "Partition maintenance" operation and change allocation percentages of one or more partitions to conform with percentage entry rules (see "Allocation Percentage").

Boot Partition error

You have removed the default boot partition from the table during a "Partition maintenance" operation. You can either replace this partition through the "Partition maintenance" operation, or select valid default boot partition through the "Modify default boot partition" or "Partition maintenance" operation.

Duplicate Names error

You have established more than one partition with both the same partition name or the same operating system name. You must change at least one of the names of one of these partitions through the "Partition maintenance" operation.

NOTE: The above three error messages can appear in a series if more than one error condition exists at the same time. The form of these series error messages can be:

Allocation and Boot Partition error

Allocation and Duplicate Names error

Boot Partition and Duplicate Names error

Allocation and Boot Partition and Duplicate Names error

All such error messages are displayed in reverse video between the default boot partition position and the operations menu.

APPENDIX A

PART

The conditions that produce any of these error messages will also prevent you from exiting from the PART utility until you have corrected the inaccurate condition(s).

Unable to communicate with the Z-217 controller

The PART utility was unsuccessful in an attempt to access the Z-217 controller, which controls the Winchester disk. This problem could indicate that the Z-217 controller is not firmly plugged into the S-100 bus, the drive cable connectors are not securely fastened, or that the controller has a hardware malfunction. Check to see that the controller card and all cable connectors are secure. Then run PREP and PART in sequence. If this error occurs after repeated attempts to run PREP and PART, contact Zenith Data Systems Technical Consultation for assistance.

Z-217 controller error on Set Drive Parameters command

One or more responses to the five drive characteristic questions were not valid for the particular drive connected. A malfunction of the Z-217 controller is also possible. Recheck the characteristics of your drive. Then run PREP and PART in sequence. If this error occurs after repeated attempts to run PREP and PART, contact Zenith Data Systems Technical Consultation for assistance.

Error - unable to re-write tables

PART was unable to record changes to the superblock after you have specified changes to the partition table and exited from PART. PART might succeed in recording some of the changed superblock information over the old superblock before this error message occurs, leaving portions of new and old superblocks on your Winchester disk. Therefore, you should use the PREP utility and then repeat the PART utility.

Unable to read superblock/SBC, disk unusable

PART was either unsuccessful in reading information stored in the existing software boot code, or successfully read the software boot code and detected a checksum error. Use the PREP utility and then repeat the PART utility.

APPENDIX A

PART

Fatal Error -- Can not read superblock B.

A bad sector error has occurred in the backup copy of the superblock (Superblock B). Try to run the PREP utilities on the disk in sequence. If repeated attempts to use PREP and PART fail, then contact Zenith Data Systems Technical Consultation for assistance.

APPENDIX B

PREP

The Utility that Initializes a Winchester Disk

The PREP utility prepares the magnetic surface of many different types of Winchester disk for use as mass storage devices in a Z-100 environment. The PREP utility is seldom (if ever) needed by most users.

The PREP utility is recorded on the Winchester Utility Disk, which is shipped with your Winchester disk hardware documentation. Although this disk runs under the Z-DOS Operating System, you can boot up with it — just as you would with a bootable CP/M-86 disk.

CAUTION: Using PREP will destroy all software and/or data stored on your Winchester disk. Do not use PREP until you have transferred your Winchester disk files to floppy disks. Winchester disks supplied by Zenith Data Systems or Heath have already been prepared by PREP before they are shipped. Therefore, users of these disks will need to use PREP only if they are consistently encountering an unreasonable number of disk access errors, and cannot correct this problem with the VERIFY utility.

NOTE: Before you use the PREP utility, a hardware component called a “jumper” must be installed at the “format enable” location on your Z-217 Winchester disk drive controller card. This jumper is already installed (although unused) at a different location on your Z-217 controller card when the card is shipped. Therefore, before you can use the PREP utility, you must move the jumper to the “format enable” location. This procedure is explained under the heading “PREP Hardware Adjustments” later in this Appendix.

After you use the PREP utility, you will have to reset and reboot the system with a bootable floppy disk.

Additionally, you should remove the jumper from the format enable location on the Z-217 controller card between the time you finish using PREP and the time you perform routine activities that involve data storage on the Winchester disk.

APPENDIX B

PREP

WARNING: Unplug your computer from its power source before touching any hardware component within the computer's cabinet.

Winchester Disk Features

"Winchester disks" come in a variety of sizes and configurations, but they all have common features. The central feature and core of a Winchester disk device is a rigid platter. The typical platter consists of a non-magnetic metal (generally aluminum) disk coated with a thin plating of ferric oxide or cobalt. This platter itself is the Winchester disk, as opposed to the floppy disk, which has a plastic (usually mylar) core with a thin coating of a similar magnetic substrate.

Platters

Winchester disk platters are generally sealed to prevent particulate matter from the environment (such as dust, smoke, dirt, or hair) from contaminating a platter's surface or read/write head. Winchester disks are available in a variety of sizes and with one or more platters. Winchester disks can be either "fixed" or "removable". The fixed disk is permanently mounted inside the device, but removable Winchester disks come in disk packs or cartridges and may be removed or interchanged.

APPENDIX B

PREP

Read/Write Heads

The read/write heads are electromagnets that slide back and forth a fraction of an inch above the surface of Winchester disk platters. The movement of a Winchester disk drive's read/write heads between the hub of the platters and the edge of the platters is called "stepping". Therefore, this movement is measured by an amount known as the "step rate".

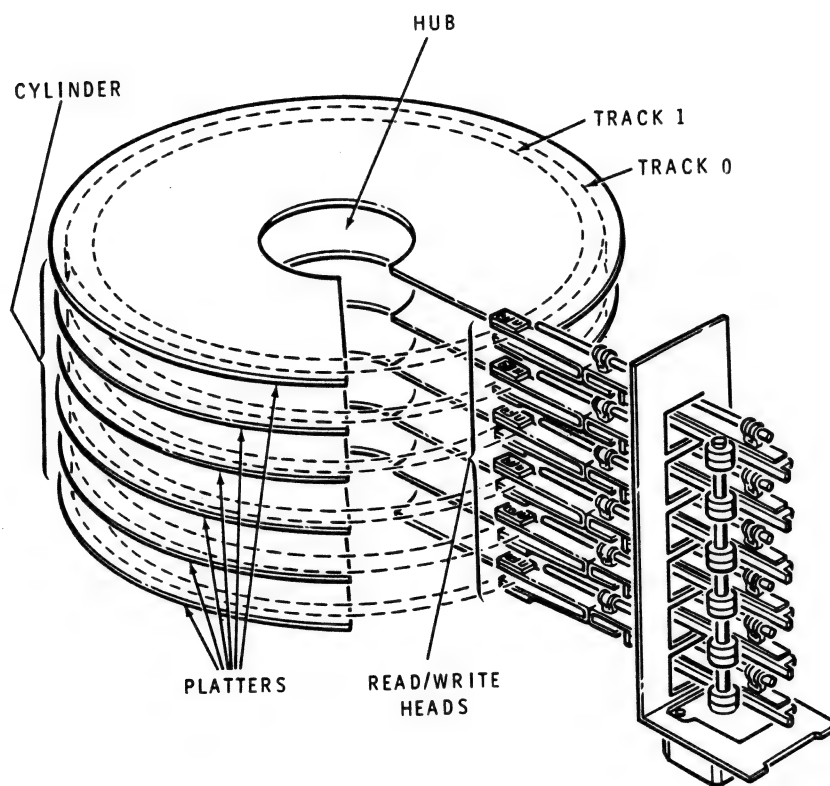


Figure B-1 Winchester Disk Components

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PREP

Logical Winchester Disk Divisions

Winchester disks that are supplied by Zenith Data Systems and Heath can be divided into several logical subunits called "partitions". This is partly because large quantities of storage locations are easier to deal with if they are subdivided. The various subdivisions help speed storage and retrieval of data.

Sectors

A "sector" is the basic unit of data organization for disk drive devices. Like floppy disks, Winchester disks are divided into sectors. Winchester disk sectors under CP/M-86 are 512 bytes long.

Tracks and Cylinders

Each recording surface of a Winchester disk platter is also divided into concentric rings called "tracks", which are similar to the tracks of a floppy disk. The Winchester disks initialized by PREP are formatted with 18 sectors per track. A further division of a Winchester disks storage area is the cylinder (see Figure B-1). A "cylinder" is a collection of all tracks that are located the same distance from the outer edge of each recording surface. Winchester disk read/write heads can access all of the data stored on a particular cylinder without any stepping movement.

For example, if a Winchester disk drive has four read/write heads, the drive can access a cylinder of 72 sectors (4 tracks times 18 sectors) without stepping (moving the heads). This amounts to a total of 36864 bytes (36 kilobytes) being read or written.

APPENDIX B

PREP

Invoking PREP

Invoke PREP by entering the following command at the Z-DOS system prompt:

A: PREP RETURN

When you invoke PREP, the following display appears:

PREP version 1.00
Copyright (C) 1982, Zenith Data Systems

The PREP utility helps you to:

- * initialize surface of Winchester disk
- * test data retention capabilities of Winchester disk media
- * isolate questionable disk sectors
- * divide the surface of Winchester disk into two partitions of equal size (one Z-DOS partition and one CP/M partition)

PREP may prompt you to specify five Winchester disk characteristics in order to identify the type of Winchester disk you have installed. Then PREP displays messages as it operates on the disk.

Caution: Using PREP can destroy all files on your Winchester disk. Winchester disks supplied by Zenith or Heath are prepared by PREP before they are shipped. Users of these disks will use PREP only after consistently encountering an unreasonable number of disk access errors. Do not use PREP until you have transferred backup copies of your Winchester disk files to floppy disks.

Do you wish to proceed with PREP (Y/N)?

Typing an **N** at this prompt ends the PREP utility and returns you to the system prompt.

Typing a **Y** causes PREP to display the following prompt:

Please type P to proceed

Typing any response other than **P** ends the PREP utility and returns you to the system prompt.

APPENDIX B

PREP

Responding to Disk Characteristic Prompts

Typing **P** at the "Please type P to proceed" prompt causes PREP to continue operation.

If the disk has been previously prepared by PREP and no errors are found in the first sector of the boot code (see the text entitled "The Reserved Winchester Area"), PREP skips these disk characteristic prompts, assumes the disk surface has been previously initialized, and proceeds immediately to disk initialization (see the text entitled "Initializing the Disk").

If the disk has not been prepared with PREP, or if there is an error found in the first sector of the boot code (see "The Reserved Winchester Area"), then the following five disk characteristic prompts will appear in sequence: (See Table B-2 for specifics of your disk.)

Enter number of heads in hex:
Enter number of cylinders in hex:
Enter reduced write current cylinder in hex:
Enter pre-comp cylinder in hex:
Enter step rate code in hex:

The significance of each of these disk characteristic prompts is explained below.

Enter number of heads in hex:

At this prompt, type a hexadecimal value for the number of read/write heads contained in the drive you are preparing. Then press **RETURN**. (See your Z-100 manual for specifications.)

Enter number of cylinders in hex:

At this prompt, type the hexadecimal value of the number of cylinders contained in the drive you are preparing. Then press **RETURN**.

For disks with floating read/write heads, this number would be equal to the total number of tracks divided by the total number of read/write heads. For disks with fixed read/write heads, this number would be equal to the total number of tracks divided by the total number of usable platter surfaces.

APPENDIX B

PREP

Enter reduced write current cylinder in hex:

At this prompt, type the hexadecimal value for the location of the first cylinder at which read/write head current must be reduced. Then press **RETURN**.

Toward the hub of the platters, where the circumference of each cylinder is smaller, data storage sectors are recorded closer together than the sectors on cylinders near the edge of the platters. Therefore, some Winchester disk drives reduce the electrical current sent to the read/write head when they write data on cylinders that are close to the hub of the disk platters. This reduction of current helps to prevent magnetic interference between the data sectors that are recorded extremely close together.

Enter pre-comp cylinder in hex:

At this prompt, enter the hexadecimal value for the number of the first cylinder at which write precompensation must take place. Then press **RETURN**.

On the cylinders located close to the hub of a Winchester disk, where data is recorded at extremely high density, bit shift can occur. "Bit shift" is a phenomenon where the data bits written at a particular location spread apart slightly on the media after they have been written. Bit shift is most likely to occur when similar bits are written close together. The "pre-comp" (write precompensation) characteristic compensates for bit shift by writing some bits earlier or later than the normal rate of data writing. Precompensation for Winchester disks causes a slight deviation (about 12 nanoseconds for every 100 nanoseconds) from the normal rate of data writing during the writing of bits that are apt to shift.

Enter step rate code in hex:

At this prompt, you should enter the hexadecimal value code that indicates the rate at which the read/write heads step between tracks. Then press **RETURN**.

After you respond to the "step rate code" prompt, PREP will automatically begin to perform its three operations (see "PREP Operations") in sequence.

APPENDIX B

PREP

The PREP utility is capable of preparing a wide variety of Winchester disks for data storage. Table B-2 lists several different Winchester disks available in the microcomputer market and indicates the hexadecimal values you should enter to prepare each disk when prompted by PART for a specific disk characteristic.

The labels for the columns of numbers in Table B-2 correspond to PREP characteristic prompts. If the model number of your Winchester disk is listed in the left-hand column of the table, then enter the numbers listed in the right-hand columns in sequence as the characteristic prompts are displayed.

APPENDIX B

PREP

According to Table B-2, if you have a Miniscribe Mod II 2012 Winchester disk drive, you should respond to the drive characteristic prompts as follows:

Enter number of heads in hex: 4 *RETURN*

Enter number of cylinders in hex: 132 *RETURN*

Enter reduced write current cylinder in hex: 200 *RETURN*

Enter pre-comp cylinder in hex: 80 *RETURN*

Enter steprate code in hex: 1 *RETURN*

Drive Model	Total Heads	Total Cylinders	Reduced Current Cylinder	Write Pre-comp Cylinder	Step Rate Code
Seagate					
ST-406	2	132	200	80	1
ST-412	4	132	200	80	1
ST-419	6	132	200	80	1
ST-506	4	99	80	40	96
ST-706	2	132	200	80	1
Miniscribe					
Mod II 2012	4	132	200	80	1
Mod III 3012	2	264	300	80	1
Mod IV 4020	4	1E0	200	80	1
IMI					
5006H	2	132	200	D6	1
5012H	4	132	200	D6	1
5018H	6	132	200	D6	1
Tandon					
TM 602S	4	99	80	40	96
TM 603S	6	99	80	40	96

Table B-2 Responses to PREP Characteristic Prompts

APPENDIX B

PREP

PREP Operations

PREP begins to prepare the surface of your Winchester disk either after displaying the initial screen messages or after you respond to the five disk characteristic prompts. PREP prepares the disk by performing three operations in sequence: Initializing the Disk, Testing the Disk Media, and Initializing the Reserved Winchester Area.

Initializing the Disk

After you have responded to the disk characteristic prompts, PREP initializes the surface of the disk for the test that will follow. While this occurs, you will see the message:

Initializing the disk...

This initialization is similar to FORMAT in that it magnetically records a map of all sectors on the disk surface. When the surface has been initialized, the message shows:

Initializing the disk...completed

and then PREP begins testing the disk media.

NOTE: If your Winchester disk hardware has not been properly adjusted, the following message will be displayed instead of the "Initializing the disk..." message:

Error during formatting of the drive.

If this message appears, you must now perform a hardware adjustment as explained in the text entitled "PREP Hardware Adjustments".

APPENDIX B

PREP

Testing the Disk Media

PREP performs seven test passes to check the integrity of the disk's storage capability. During each pass, PREP writes a predetermined code to each sector (the drive light will flicker) and then reads back that code to verify that it remained correct (the drive light will appear as constantly on). PREP keeps you informed of its progress by displaying the message:

Media test in progress, pass n

Where n is the number (in the range 1-7) of the pass that it is currently conducting.

Be patient. This PREP operation can take from 45 to 90 minutes because of the large number of sectors that PREP must test.

PREP uses a different code on each pass it makes through the test. If PREP finds sectors containing unusable media, it stores the address of these sectors, and later places these sector addresses into a bad sector table.

APPENDIX B

PREP

Initializing the Reserved Winchester Area

After completing the media tests, PREP records and verifies the Reserved Winchester Area (see "The Reserved Winchester Area") on the first several sectors of the Winchester disk. During this operation, PREP displays the following message:

```
Initializing the disk...
```

If PREP adds the word completed to the end of this display, and displays the system prompt, then all PREP operations are complete. The display should appear as follows:

```
Initializing the disk...completed
```

```
A:
```

Then you should reset the system and boot up with a bootable floppy disk. If you wish to use the PART utility immediately, then boot up with a copy of the Winchester Utility Disk. If you wish to perform any other operation, then boot up with a floppy disk.

NOTE: You will not be able to access any partition after using PREP until you reset the system and boot up with the appropriate bootable floppy disk.

CAUTION: After using PREP, you should remove a hardware component called a jumper from the "format enable" location on the Z-217 Winchester Disk Controller Board. Refer to the text entitled "PREP Hardware Adjustments" for instructions on removing this component. This procedure will help to protect the data on your Winchester disk from being accidentally destroyed.

APPENDIX B

PREP

The Reserved Winchester Area

NOTE: Information concerning the Reserved Winchester Area is not essential for use of the PREP utility or the Winchester disk. This information is provided for users who wish to obtain a deeper understanding of the operations that PREP performs in order to prepare a Winchester disk.

When the PREP utility is run, it records units of Winchester support software on the first 36 usable sectors of the Winchester disk. These software units are collectively known as the Reserved Winchester Area. They are recorded on the Winchester disk during PREP's reserved area initialization operation (see Initializing the Reserved Winchester Area). These software units are arranged as shown in Table B-3.

SECTORS USED	WINCHESTER SUPPORT SOFTWARE UNITS
5	Software Boot Code (SBC)
1	Superblock A
1	Bad Sector Table A
11	blank
1	Superblock B
1	Bad Sector Table B
16	blank
36	TOTAL RESERVED WINCHESTER AREA

Table B-3 Winchester Support Software Units within Reserved Winchester Area

APPENDIX B

PREP

The most important Winchester support software units listed in Table B-3 are the software boot code, the superblocks, and the bad sector tables.

These units are vital to you during Winchester bootup because they help you to access a particular partition after you access the Winchester disk itself. Users of CP/M-86 with the Winchester disk also use these data structures to make unusable media (bad sectors) inaccessible before FORMAT is run.

The blanks inserted between the "A" copies of the superblock and bad sector table and the "B" copies of these units help to decrease the chance that all important Winchester support software units could be simultaneously damaged.

If you must access any part of the reserved Winchester area, you can determine the location of the Winchester support software units by examining the pointers in the software boot code. The software boot code will begin at sector zero regardless of the location of the other software units.

The Software Boot Code (SBC)

The "software boot code" (SBC) is a Winchester support unit that helps locate the partition to be booted after entry of a Winchester disk bootup command. The SBC also helps you to avoid bad sectors during disk access by referring to a bad sector table.

PREP records the SBC on the first 5 sectors of the Winchester disk during initialization of the reserved Winchester area (see "Initializing the Reserved Winchester Area").

APPENDIX B

PREP

Role of SBC During Bootup

When you enter a Winchester disk bootup command (see "Bootup with a Winchester Disk"), the computer will load the SBC into Random Access Memory (RAM).

Once within RAM, the SBC begins to access a partition. The partition that is accessed is determined either by a bootstring or a default boot partition. A bootstring can be specified by the user during bootup. A default boot partition is stored in a fixed location within the SBC (see the text entitled "SBC Entries").

In order to access a partition, the SBC must match the specified bootstring or default boot partition with a partition that exists in the superblock's table of partitions (see the text entitled "The Superblock").

When the SBC finds a partition that matches the specified bootstring or default boot partition, the SBC loads the first 32 sectors of that partition into RAM. If the accessed partition contains CP/M-86, then the CP/M-86 boot loader program will begin to execute the remainder of the bootup operation.

SBC Entries

The entries included in the first 128 bytes of the SBC are described in Table B-4.

APPENDIX B

PREP

BYTES	SBC ENTRIES
3	System bytes
1	PART/SBC version number (Used to synchronize different releases of software)
1	PART/SBC revision number (Used to synchronize different releases of software)
27	Default bootstring (16 bytes define the partition name, one byte defines the semicolon, and 10 bytes define the operating system name)
3	Beginning sector address of bad sector table A
3	Beginning sector address of bad sector table B
3	Beginning sector address of superblock A
3	Beginning sector address of superblock B
2	Sector size (512 bytes per sector)
2	Sectors per track (18)
6	Reserved for future expansion
3	Number of sectors on entire Winchester disk
1	Reserved for future expansion
2	Checksum for superblock copy A
2	Checksum for superblock copy B
2	Checksum for bad sector table copy A
2	Checksum for bad sector table copy B
12	Set drive for Z-217 controller
3	Address of first user sector (first sector beyond Reserved Winchester Area)
6	Date partitioned, or default date, when PART is run (When PREP is run, the value 00 is used for each byte.)
2	Checksum of SBC (assuming initial value is zero)
39	Reserved for future expansion
128	FIRST QUARTER-SECTOR OF SBC

Table B-4 Software Boot Code Entries

APPENDIX B

PREP

The format for each three-byte sector number is low, middle, high byte.

NOTE: Table B-4 describes one quarter-sector of the five-sector SBC. The rest of the SBC consists of the assembly instructions that lead to the actual access of the specified partition.

SBC Verification

A checking code called a "checksum" is calculated by PREP for the SBC before PREP records the SBC on the disk. The results of these checksums are recorded in entries within the SBC.

Then, when execution of either PART or PREP is repeated on the same Winchester disk, the utility first performs checksums to verify that the SBC has not changed since the original checksums were performed.

If the SBC has changed, or if it cannot be read, then an error message will be displayed.

The SBC also contains the checksums used to verify the other Winchester support units (the superblocks and bad sector tables).

The Superblock

The "superblock" is a Winchester support unit that contains information about each partition on the disk. It contains the following items for each of 17 defined partitions:

- partition name
- operating system name
- flag byte (to show whether PREP or PART has been run on the disk since the last time the partition was formatted)
- address of the starting sector

APPENDIX B

PREP

Superblock Entries

These items occupy 30 bytes per entry. The 17 superblock entries are structured as shown in Table B-5.

BYTES	SUPERBLOCK ENTRY
30	Entry for 1st partition (including 16-bytes partition name, 10-byte system name, 1-byte flag, and 3-byte starting sector)
30	Entry for 2nd partition (including 16-bytes partition name, 10-byte system name, 1-byte flag, and 3-byte starting sector)
30	Entry for 3rd partition (including 16-bytes partition name, 10-byte system name, 1-byte flag, and 3-byte starting sector)
.	.
.	.
30	Entry for 16th partition (including 16-bytes partition name, 10-byte system name, 1-byte flag, and 3-byte starting sector)
30	Entry for 17th partition (including 16-bytes partition name, 10-byte system name, 1-byte flag, and 3-byte starting sector)
2	Reserved for future expansion
512	TOTAL FOR EACH SUPERBLOCK

Table B-5 Superblock Entries

NOTE: Refer to the text entitled "The Superblock" in the text on PART for a detailed explanation of the components of each superblock entry and other information concerning the superblock.

APPENDIX B

PREP

Superblock Verification

During initialization of the reserved Winchester area (see the text entitled "Initializing the Reserved Winchester Area"), PREP records superblock entries twice on the Winchester disk. The primary copy of the superblock, called Superblock A, is used unless some of its contents have been damaged since it was recorded. The backup copy of the superblock, called Superblock B, is used if Superblock A is damaged. Each copy is recorded several sectors apart to decrease the chance that both could be simultaneously damaged.

A checking code called a "checksum" is calculated by PREP for each superblock copy before PREP records these superblock copies on the Winchester disk. The results of these checksums are recorded in the software boot code (see "The Software Boot Code (SBC)").

Then, when execution of either PART or PREP is repeated the utility first performs verification checksums to verify that the superblocks have not changed since the original checksums were performed.

If the utility encounters difficulty in reading Superblock A, or if the results of the second checksum of Superblock A differ from the results of the original checksum, then the utility tries to read Superblock B.

If Superblock B cannot be read, or if the results of the second checksum of Superblock B differ from the results of the original checksum, then all partitions will be inaccessible.

The Bad Sector Table

The "bad sector table" is an ordered list of the addresses of each sector on the disk that contains unusable media. The information in the bad sector table enables CP/M-86 to avoid bad sectors (unusable media) when it accesses a partition during your everyday activities.

The bad sector table can include the addresses of as many as 169 bad sectors. Each bad sector address is recorded in a three-byte entry. Entries that do not contain the address of a bad sector are filled with three zeroes.

APPENDIX B

PREP

Bad Sector Table Entries

The structure of the bad sector table is explained in Table B-6.

During media testing (see “Testing the Disk Media”), PREP maintains a record of the location of all the bad sectors (sectors containing unusable media) that it finds on the disk. Then, during initialization of the reserved Winchester area (see “Initializing the Reserved Winchester Area”), PREP creates a table of all bad sectors and records two copies of this table on the disk.

BYTES	BAD SECTOR TABLE ENTRY
3	Address of 1st bad sector found by PREP
3	Address of 2nd bad sector found by PREP
3	Address of 3rd bad sector found by PREP
3	Address of 4th bad sector found by PREP
.	.
.	.
.	.
3	Address of 168th bad sector found by PREP
3	Address of 169th bad sector found by PREP
3	Last entry in table (always contains 000)
2	Reserved for future expansion
512	TOTAL FOR EACH BAD SECTOR TABLE

Table B-6 Bad Sector Table Entries

APPENDIX B

PREP

Bad Sector Table Verification

The primary copy of the bad sector table, called Bad Sector Table A, is used unless some of its contents have been damaged since it was recorded. The backup copy of the bad sector table, called Bad Sector Table B, is used if Bad Sector Table A is damaged. Each copy is recorded several sectors apart, to decrease the chance that both could be simultaneously damaged.

A checking code called a "checksum" is calculated by PREP for each of the copies of the bad sector table before PREP records these bad sector table copies on the Winchester disk. The results of these checksums are recorded in the software boot code (see "The Software Boot Code (SBC)").

Then, when execution of PREP or PART is repeated on the same Winchester disk, the utility first performs checksums to verify that the bad sector tables have not changed since the original checksums were performed.

If Bad Sector Table A cannot be read, or if the results of the second checksum of Bad Sector Table A differ from the results of the original checksum, then Bad Sector Table B is read.

If Bad Sector Table B cannot be read, or if the results of the second checksum of Bad Sector Table B differ from the results of the original checksum, then no bad sector table information will be available in the Reserved Winchester Area. If the FORMAT utility is then used on a partition of this disk, it will assume that the disk has no bad sectors and format without avoiding any bad sectors. If the VERIFY utility is used on this disk, it will find no bad sector table to which it can append new bad sectors. Therefore, it will search the disk for all bad sectors and create a new bad sector table.

APPENDIX B

PREP

PREP Hardware Adjustments

Before you can use the PREP utility, a hardware component within your Z-100 computer must be moved from one location to another. This text section explains the procedure you must perform in order to properly move this component.

This component must be moved each time you use PREP because its position during use of PREP is different from its position during all other Winchester disk activities.

Jumper Description

This hardware component is called a "jumper". A jumper is an insulated metal clip or wire used to connect different locations on a circuit board.

In this case, the jumper used is a small conductive metal clip covered with a box-like plastic case. This kind of jumper is known as a Berg jumper.

This jumper is designed to fit over two metal pins protruding from the circuit board known as the Z-217 Winchester Disk Controller Board (or controller card).

When you use PREP, the jumper must cover two of the pins on the Z-217 to allow PREP to initialize the Winchester disk. When you perform any activity other than PREP, the jumper must be stored at a different location on the Z-217.

APPENDIX B

PREP

Jumper Movement Procedure

This procedure explains the sequence of steps you should perform to adjust your hardware both before and after using PREP.

WARNING: The internal components of your computer can cause severe electric shock if touched while the computer is running. Therefore, you should turn off your computer and unplug it from its power source before touching any hardware component within the computer's cabinet.

1. Remove any disk that may be in the floppy disk drive.
2. Turn off your computer's power and unplug it from the power source.
3. Remove the cabinet top from your computer. (Refer to Appendix I of the Z-100 Series User's Manual for detailed information on removing this top.)
4. Locate the Z-217 Winchester Disk Controller Board in the "Card Cage".

NOTE: Your computer also contains a disk controller board for floppy disks (called the Z-207). The Z-217 Winchester Disk Controller Board is the board that is connected to the Winchester disk drive (rather than the floppy disk drive) by a flat, ribbon-like cable.

5. Gently slide the Z-217 controller board upward until the area shown in Inset #1 of Figure B-2 is above the top of the card cage. Do not remove the Z-217 board completely from the card cage. As you slide the board upward, be certain that some of the board is still anchored between the card cage's vertical tracks.

NOTE: In order to slide the Z-217 controller board upward, you might first have to temporarily unplug the Z-217 cable and/or cables that lie above the Z-217 board.

APPENDIX B

PREP

6. Locate the jumper covering the pins shown in Inset #1 of Figure B-2. Remove this jumper by carefully sliding it away from the board. Be careful not to bend the pins.

NOTE: The pins shown in Inset #1 are known as the Z-217 interrupt pins. These pins need not be connected by the jumper while you are using PREP.

7. Locate the two pins shown in Inset #2 of Figure B-2. Carefully slide the jumper over these pins. Be careful not to bend the pins.

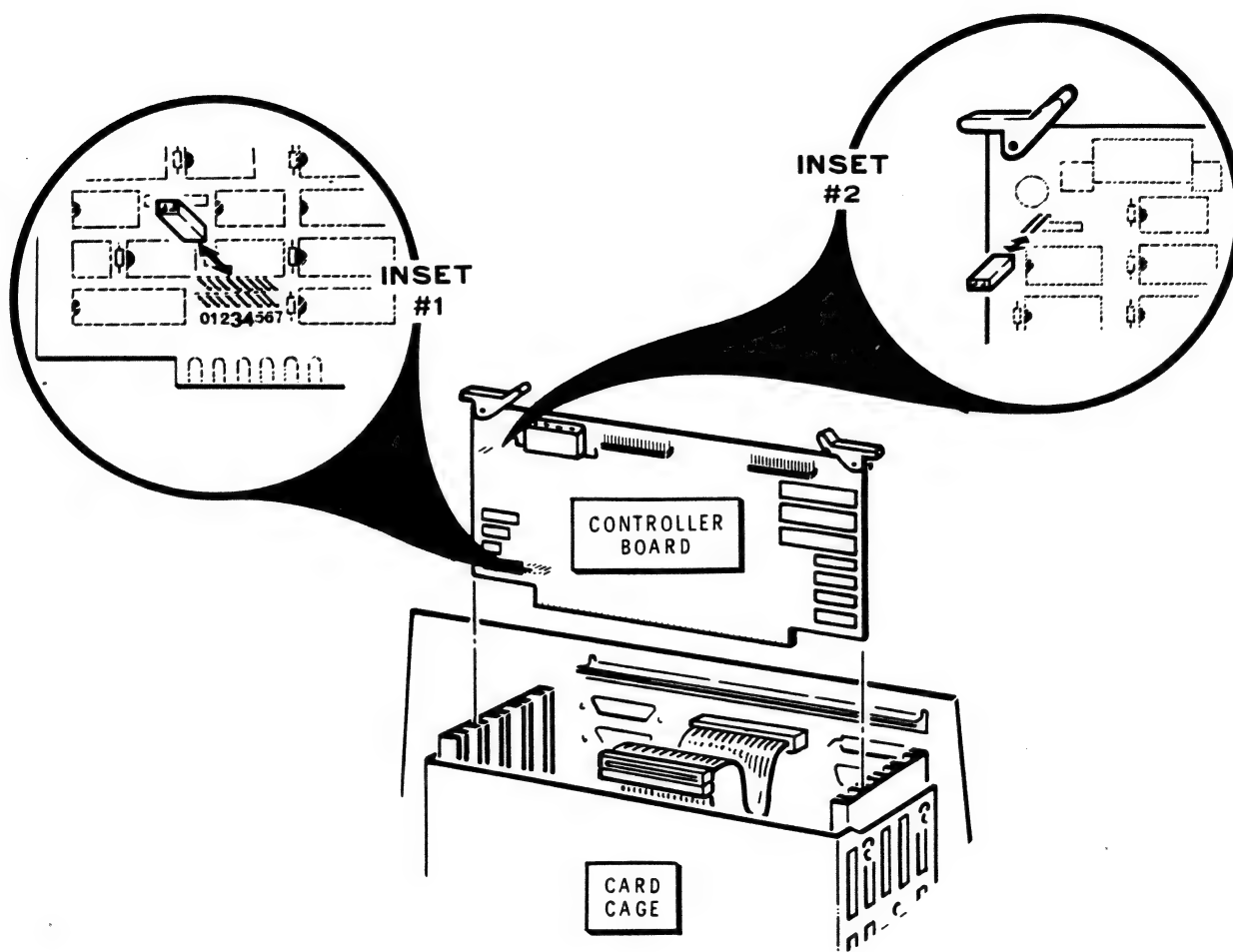


Figure B-2 Z-217 Controller Board Adjustment

APPENDIX B

PREP

NOTE: The pins shown in Inset #2 are known as the "format enable" pins. When connected by the jumper, your Winchester disk can be initialized by PREP.

8. Gently slide the Z-217 board downward until the bottom edge of the board is securely engaged to the horizontal connector at the bottom of the card cage.

NOTE: Be careful that the Z-217 remains between the same pair of vertical card cage tracks as you slide it downward.

9. If you have unplugged any internal cables, plug them back into the appropriate sockets on the controller boards. Make sure that all cables are firmly connected.
10. Replace the top cover of your computer and make sure that it is completely latched into position.
11. Plug the computer back into the power source and turn on the computer.

Proceed to use the PREP utility as explained in the text entitled "Invoking PREP".

When you have finished using the PREP utility, perform the steps of this procedure in reverse sequence to remove the jumper from the Z-217 format enable pins and replace it on the Z-217 interrupt pins.

CAUTION: You must remove the jumper from the format enable pins before performing any other activity. If this jumper remains on the format enable pins, irregularities in the power supply can cause the Winchester disk to be automatically initialized during normal use of the disk. This initialization will destroy any data recorded on the disk.

APPENDIX B

PREP

PREP Error Messages

Bad sector count exceeded for this drive.

Cause: The upper bound limit for bad sectors has been exceeded. This could indicate a hardware malfunction.

Cure: Run PREP again. If this error message reappears after repeated use of PREP, then contact Zenith Data Systems Technical Consultation for assistance.

Error -- Can not read superblock A.

Cause: A bad sector error has occurred in the primary superblock (Superblock A).

Cure: PREP will automatically use the backup copy of the superblock (Superblock B) and resume the operation it was conducting when the error message was displayed. However, this message indicates that only one usable copy of the superblock remains on the disk. Although you could use the disk in this condition, all Winchester disk data will become inaccessible if Superblock B is ever damaged. Therefore, we recommend that you run PREP again if this error message appears.

Error -- Drive capacity > 32 megabytes!

Cause: PREP has calculated that the Winchester disk drive connected to the Z-217 controller is larger than the maximum allowable size of 32 megabytes.

Cure: Run PREP again, being careful to respond with the correct values to the drive characteristic prompts.

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PREP

Error during formatting of the drive.

Cause: This could mean that you responded incorrectly to the five prompts about the drive's characteristics. This message could also indicate either a hardware malfunction or improper positioning of the format enable jumper on the Z-217 controller board.

Cure: Refer to the text entitled "PREP Hardware Adjustment". If you have not already done so, move the jumper to the "format enable" position on the Z-217 controller board. Then invoke PREP again, and double check your responses to the five drive characteristic prompts if they appear. After using PREP, remove the jumper from the "format enable" position.

Invalid HEX value, Try again:

Cause: Value entered was not a valid hexadecimal number, or the value entered was outside of the possible range.

Cure: Double check the appropriate hexadecimal value against the disk manufacturer's documentation or Table B.2 in this supplement. Then attempt to enter the correct value at the prompt again.

Track 0 contains bad sector(s).

Cause: A bad sector error has occurred in the reserved area of the Winchester disk. This could indicate a hardware malfunction.

Cure: Run PREP again. If this error message reappears after repeated use of PREP, then contact Zenith Data Systems Technical Consultation for assistance.

Unable to communicate with the Z217 controller

Cause: PREP can not locate the Z-217 controller. This could mean that the Z-217 is not firmly plugged into the S-100 bus, that the drive cable connectors are not securely fastened, or that the controller has a hardware malfunction.

Cure: Check to see that the controller card and all cable connectors are secure, and run PREP again.

APPENDIX B

PREP

Unable to write default PART values

Cause: An error was encountered as PREP attempted to write the superblocks. This error condition can be caused by media imperfections at the sectors where PREP is trying to write a copy of the superblock.

Cure: Run PREP again. If this error message reappears after repeated use of PREP, then contact Zenith Data Systems Technical Consultation for assistance.

Z-217 controller error on Set Drive parameters command

Cause: One or more responses to the five drive characteristic prompts were not valid for the particular drive connected. A malfunction of the Z-217 controller is also possible.

Cure: Recheck the drive characteristics and run PREP again. If this error occurs after repeated attempts to run PREP, consult Zenith Technical Consultation or your service representative.

APPENDIX C

SHIP*The Utility that Moves Read/Write Heads
to a Safe Position*

The SHIP utility moves the read/write heads of a Winchester disk to a position where they can not contact and destroy stored data on a disk platter in case of physical shock.

The SHIP utility is recorded on the Winchester Utility Disk, which is supplied with your Winchester disk hardware documentation. Although the Winchester Utility Disk runs under the Z-DOS Operating System, you can boot up with it — just as you would with a bootable CP/M-86 disk.

Winchester Disk Safety

Winchester disks are sensitive precision instruments that can be easily affected by physical shock or impact. The data stored on a Winchester disk is also vulnerable. Because of this vulnerability, you should take special precautions by running SHIP before shipping your Winchester disk, or even before moving the disk across the room.

The SHIP command enables you to protect your Winchester disk, and the data on the disk. SHIP affords this protection by moving the disk's read/write heads towards the hub of the Winchester disk platters. When in this position, the heads and platters will not be damaged by platter vibration that can be caused by physical shock.

Although platters can be caused to vibrate at their outside edges, the platter area near the hub is rigid enough to inhibit vibration. Therefore, the heads and platters are safer when the heads are near the hub.

Run SHIP whenever you intend to physically move the unit containing your Winchester disk.

APPENDIX C

SHIP

To use SHIP, invoke the utility at the system prompt and enter a cylinder address value at the prompt, as explained below.

NOTE: The Z-217 controller card causes the read/write heads to move to cylinder zero the first time you access the Winchester disk after power up. Therefore, the head positioning caused by SHIP will remain in effect only until you turn the disk on again and access it.

Invoking SHIP

To invoke SHIP by this method, type the following command:

A: SHIP RETURN

When invoked, SHIP displays a message in the following form:

SHIP version 1.00
Copyright (C) 1983, Zenith Data Systems

The SHIP utility helps you to:

- * Position the read/write heads of the Winchester disk at a safe location for subsequent transportation of the Winchester drive unit.

SHIP will prompt you to specify a cylinder address to identify where the read/write heads should be moved.

Enter shipping cylinder address in hex:

APPENDIX C

SHIP

Entering the Shipping Cylinder

At the "Enter shipping cylinder address in hex:" prompt you should enter a hexadecimal value for the address of the cylinder at which the read/write heads should be positioned when the Winchester disk is physically moved. Refer to Table C-7 or to your Winchester disk hardware documentation if you are uncertain of this number. Then press **RETURN**.

NOTE: If you do not wish to move the heads at this time, then enter **CTRL-C** at the prompt.

After you have responded to the SHIP prompt, SHIP will move the read/write heads to the specified cylinder. Then Z-DOS will display the system prompt:

A:

NOTE: After using the SHIP utility, you will have to reset and reboot the system with a bootable floppy disk.

APPENDIX C

SHIP

Table C-7 shows the values you should enter in response to the SHIP prompt if you own any of the list Winchester disks.

Drive Model	Cylinder Position for Shipping
Seagate	
ST-406	131
ST-412	131
ST-419	131
ST-506	9A
ST-706	131
Miniscribe	
Mod II 2012	14F
Mod III 3012	28D
Mod IV 4020	209
IMI	
5006H	148
5012H	148
5018H	148
Tandon	
TM 602S	9A
TM 603S	9A

Table C-7 Responses to SHIP Prompts

NOTE: If Table C-7 and your Winchester disk hardware documentation do not explain how the read/write heads should be positioned, then respond to the SHIP prompt by entering the hexadecimal value for the last cylinder on your disk. For instance if your disk has 132 cylinders, enter **132** and **RETURN** at this prompt.

SHIP Error Messages

Invalid HEX value, Try again:

Cause: Value entered was not a valid hexadecimal number, or the value entered was outside of the possible range.

Cure: Double check the appropriate hexadecimal value against the disk manufacturer's documentation or Table C-7. Then enter the correct value at the question again, and press **RETURN**.

Unable to communicate with the Z-217 controller

Cause: SHIP can not locate the Z-217 controller. This could mean that the Z-217 is not firmly plugged into the S-100 bus, that the drive cable connectors are not securely fastened, or that the controller has a hardware malfunction.

Cure: Check to see that the controller card and all cable connectors are secure, and run SHIP again. If this error occurs after repeated attempts to run SHIP, consult Zenith Technical Consultation or your service representative.

Z-217 controller error on Set Drive Parameters command

Cause: Your response to the Enter shipping cylinder address in hex prompt was not valid for the particular drive connected. A malfunction of the Z-217 controller is also possible.

Cure: Recheck the drive parameters and run SHIP again. If this error occurs after repeated attempts to run SHIP, consult Zenith Technical Consultation or your service representative.

APPENDIX D

VERIFY

The Utility that Isolates Recent Bad Sectors on Your Winchester Disk

The VERIFY utility examines your Winchester disk for any bad sectors (media imperfections) that have occurred since the disk was shipped or since the PREP utility was last used. Then VERIFY adds the addresses of these bad sectors to a list of bad sectors that was recorded on the Winchester disk when PREP was run. This list is called the bad sector table.

The VERIFY utility is shipped on the Winchester Utility Disk.

The PREP utility has already been run on all Winchester disks supplied by Zenith Data Systems or Heath. (Refer to the text entitled "The Bad Sector Table" under "PREP" for information on the bad sector table.)

NOTE: After using the VERIFY utility, you must reset and reboot the system. Use bootable media other than the Winchester Utility Disk to reboot after using VERIFY.

Bad Sectors

Bad sectors are media imperfections that can cause hard errors during Winchester disk access operations. Hard errors are conditions in which an operation failed after a number of repeated attempts. Recovery from a hard error usually brings an abrupt end to the operation being attempted.

However, the VERIFY utility enables you to prevent hard errors from occurring in the future if these errors were caused by bad sectors. If VERIFY finds a reasonable number of new bad sectors (between 1 and 169), it adds them to the bad sector table that was originally created by the PREP utility.

APPENDIX D

VERIFY

The PREP utility (which is used before shipping on Winchester disks supplied by Zenith Data Systems or Heath) initializes the Winchester disk. PREP also helps you to make bad sectors inaccessible by creating a table of all the bad sectors, and storing this table on the Winchester disk.

Then, the next time you format a partition, FORMAT will take into consideration the newly acknowledged bad sectors. FORMAT will set up sector boundaries that will prevent usage of the bad sectors during all operations that occur after the formatting operation.

However, you might also obtain hard errors during Winchester disk access due to the following other problems:

- Excessive physical shock
- Entry of foreign material (such as smoke) into the Winchester disk chamber
- Malfunction of the Z-217 controller card
- Temporary loss of power to the disk

If one of these problems causes a hard error, then the disk might not have any new bad sectors for VERIFY to find. In such a case, you should back up the files from your Winchester disk. Then you should use the PREP utility. If you still encounter hard errors after using PREP, contact Zenith Data Systems Technical Consultation for assistance.

APPENDIX D

VERIFY

VERIFY Entries

VERIFY does not destroy any of the data on the Winchester disk. However, if you use VERIFY to isolate bad sectors, then we recommend that after VERIFY, you use BACKUP to copy all files from the partition on which the bad sectors occurred. Then you should use FORMAT on the partition on which the bad sectors occurred. Finally you should use RESTORE to replace the backed up files on this partition.

Invoking Verify

To invoke VERIFY, type the following command at the system prompt:

```
A: VERIFY RETURN
```

VERIFY will display the following message and prompt:

```
VERIFY version x.xx  
Copyright(C) 1982, Zenith Data Systems
```

The VERIFY utility helps you to:

- * Locate sectors that have failed since you last ran PREP

Do you wish to proceed with VERIFY (Y/N)?

Confirming Intentions to use Verify

At the "Do you wish to proceed with VERIFY (Y/N)?" prompt, you can press Y to continue with the utility, or press any other key to exit to the system.

If you press Y to continue, VERIFY displays the following prompt:

Enter bad sector address, or zero to end:

APPENDIX D

VERIFY

Entering Bad Sector Addresses

When error conditions are encountered during Winchester disk access operations, CP/M-86 displays a hard error message that is slightly different from a floppy disk hard error message.

This Winchester disk error message appears in the following form:

HARD {operation} ERROR ON DRIVE {d:} STATUS {nn} SECTOR {ssss}

Where {operation} identifies the operation that was being performed when the error occurred. This operation could be worded as:

READ

or

WRITE

where {d:} is the name of the drive to which the partition was assigned when an error was encountered on the partition;

where {nn} is a code for the status of the error. These status codes are explained in the Z-217 Technical Manual; and

where {ssss} is the logical hexadecimal address of the sector on which the hard error occurred. (Logical sector addresses begin with the first sector on the entire Winchester disk, which is sector 0000.)

An error message in this form does not always indicate that your Winchester disk has bad sectors. When you receive such an error message, record the status code, and refer to the Z-217 Technical Manual to determine the meaning of this code. If the error message includes a status code with the number 80 or 81 or a number from 00 through 05 or from 20 through 40, then the error message probably does **not** indicate a bad sector or a reason for using the VERIFY utility.

However, if the error message includes a status code with a number from 10 through 17, then it is likely that your Winchester disk has developed a bad sector. Therefore, you should record the sector address that is also displayed in the error message, and use this sector address to respond to the "Enter bad sector address, or zero to end:" prompt.

We recommend that you also record the partition name and system name of the partition on which the error(s) occurred.

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VERIFY

At the "Enter bad sector address, or zero to end:" prompt, enter the address of the logical sector at which the error(s) occurred, or type the digit zero (0) to begin media verification.

If you enter the address of a logical sector, then VERIFY will continue to display the

Enter bad sector address, or zero to end:

until you enter a zero.

VERIFY Operation

When VERIFY begins to search for bad sectors (after you have typed a zero at the bad sector address prompt) VERIFY displays the message:

Beginning verification...

Verification Completion

When VERIFY is finished verifying the disk, it will display the following message:

Beginning verification...Completed

Verification Report

If VERIFY found no bad sectors during the operation, it will also display the following message:

No bad sectors located.

If VERIFY found a reasonable number (1–169) of bad sectors during its search, it will display the following message:

Bad sectors located. Tables modified

APPENDIX D

VERIFY

NOTE: The words Tables modified will not appear in this message if VERIFY is unsuccessful in recording the new bad sector information at the end of the bad sector table.

If VERIFY finds more than 169 bad sectors on the Winchester disk, it will display the following message:

Bad sector count exceeded for this drive.

VERIFY Followup Activities

After you use the VERIFY utility, the data stored on your Winchester disk will still be intact (except the data that was recorded over bad sectors). However, the addition to the bad sector table that VERIFY provides will not be put to use until you use the FORMAT utility on the newly verified media.

The bad sectors that VERIFY found will not become inaccessible until FORMAT is used on the partition that contained the bad sectors. FORMAT will redefine the sector boundaries of the partition so that the bad sectors cannot be accessed.

- | | |
|----------------|---|
| Reset | Reset the computer after using VERIFY, (No partition will be accessible until you do.) |
| Boot up | If you have not already done so, boot up to a floppy disk or partition (other than the partition just verified) that contains the CP/M-86 Operating System. |
| ASSIGN | If necessary, assign the partition on which the error occurred to a drive. |
| BACKUP | Use the BACKUP utility to copy all of the files from the partition to floppy disks. |

APPENDIX D

VERIFY

- FORMAT** When all of the Winchester disk files have been safely backed up to floppy disk media, use the FORMAT utility. Specify the drive that has been assigned the partition on which the bad sector(s) occurred.
- LDCOPY** Use the LDCOPY utility to copy a CP/M system to the newly formatted partition. If you booted up with a floppy disk, use LDCOPY with file BOOT217. If you booted up with another partition, you can use LDCOPY without BOOT217.
- RESTORE** After formatting this partition, use the RESTORE utility to copy the backed up files back to the Winchester disk partition.

You should take the earliest possible opportunity after verifying to perform these activities to insure the safety of your stored software and data.

APPENDIX D

VERIFY

VERIFY Error Messages

Bad sector count exceeded for this drive.

Cause: The upper bound limit of 169 bad sectors has been exceeded. This could indicate a hardware malfunction.

Cure: Run VERIFY again. If this error message appears after repeating VERIFY, then run PREP. If this error message appears after running PREP, then contact Zenith Data Systems Technical Consultation for assistance.

Error -- Can not read superblock A.

Cause: A bad sector error has occurred in the primary superblock (Superblock A).

Cure: This condition is self correcting. The backup or secondary superblock (Superblock B) will now be used. However, we advise that you now back up all of your files and then run PREP and PART again. If superblock B ever becomes unreadable, all data on the Winchester disk will become inaccessible.

Error -- Drive capacity > 32 megabytes!

Cause: VERIFY has calculated that the Winchester drive connected to the Z-217 controller card is larger than the maximum allowable size of 32 megabytes.

Cure: Run VERIFY being careful to respond with the correct values to the drive parameter questions.

Error -- Unable to read boot code from partition

Cause: The boot code on the specified partition is either not present, or it has developed a bad sector.

Cure: Boot from another drive. Then run VERIFY, reset, reboot, and run ASSIGN, BACKUP, FORMAT and RESTORE on the partition where the error occurred. If that partition is totally unavailable, you may need to run the PREP utility.

APPENDIX D

VERIFY

Fatal Error -- Can not read superblock B.

Cause: A bad sector error has occurred in the backup copy of the superblock.

Cure: Run VERIFY again.

Invalid HEX value, Try again:

Cause: Value entered was not a valid hexadecimal number, or the value entered was outside of the possible range.

Cure: Double check the appropriate hex value, and re-enter.

Track 0 contains bad sector(s).

Cause: A bad sector error has occurred in the reserved area of the hard disk. This could indicate a hardware malfunction.

Cure: Run VERIFY again. If this error message appears after repeating VERIFY, then run PREP. If this error message appears after running PREP, then contact Zenith Data Systems Technical Consultation for assistance.

Unable to communicate with the Z217 controller

Cause: VERIFY can not locate the Z-217 controller. This could mean that the Z-217 is not firmly plugged into the S-100 bus, all of the drive cable connectors are not securely fastened, or that the controller has a hardware malfunction.

Cure: Check to see that the controller card and all cable connectors are secure, and run VERIFY again. If this error message appears after repeating VERIFY, then run PREP. If this error message appears after running PREP, then contact Zenith Data Systems Technical Consultation for assistance.

APPENDIX D

VERIFY

Unable to re-write tables, disk unusable!

Cause: VERIFY is unable to record data in the reserved Winchester area of your Winchester disk.

Cure: Run PREP. If this error message appears after running PREP, then contact Zenith Data Systems Technical Consultation for assistance:

Z-217 controller error on Set Drive Parameters command

Cause: One or more of the drive characteristics specified in the reserved Winchester area is not valid for your Winchester disk drive.

Cure: Run PREP, making certain that you enter the proper drive characteristics for your Winchester disk drive. If this error message appears after running PREP, then contact Zenith Data Systems Technical Consultation for assistance.

APPENDIX E

Using Non-Zenith Hardware

Changing 8-Inch Disk Step Rates

Zenith Data Systems is providing 8-inch drivers installed in the CP/M-86 disk systems for development purposes and to support future products. Zenith Data Systems does not guarantee proper operation of the 8-inch drivers with disk systems obtained from other vendors. However, for the benefit of customers who wish to experiment with non-Zenith hardware at their own risk, the track-to-track stepping rate, which is set at 3 milliseconds, may be changed by using the DDT86 command. In the example shown below, the rate is changed from 3 milliseconds to 15 milliseconds. User input is shown in bold:

```
A>STAT CPM.SYS $R/W
```

```
CPM.SYS set to R/W
```

```
A>REN CPMSYS.OLD=CPM.SYS
```

```
A>DDT86
```

```
DDT86 VER 1.1
```

```
-RCPMSYS.OLD
```

```
START      END
```

```
nnnn:0000 nnnn:xxxx
```

```
-XCS
```

```
CS 0000 nnnn+8      ;The effect of the register
DS 0000 nnnn+8      ;change is to set all segment
SS 0040 nnnn+8      ;registers to the beginning of
ES 0000 nnnn+8      ;the program past the header
IP 0000 .
```

```
-S4B11
```

```
nnnn+8:4B11 00 03    (00=3mS, 01=6mS, 02=10mS, 03=mS)
```

```
nnnn+8:4B12 04 .
```

```
-S4B29
```

```
nnnn+8:4B29 00 03    (00=3mS, 01=6mS, 02=10mS, 03=mS)
```

```
nnnn+8:4b2A 04 .
```

```
-WCPM.SYS
```

```
-^C
```


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